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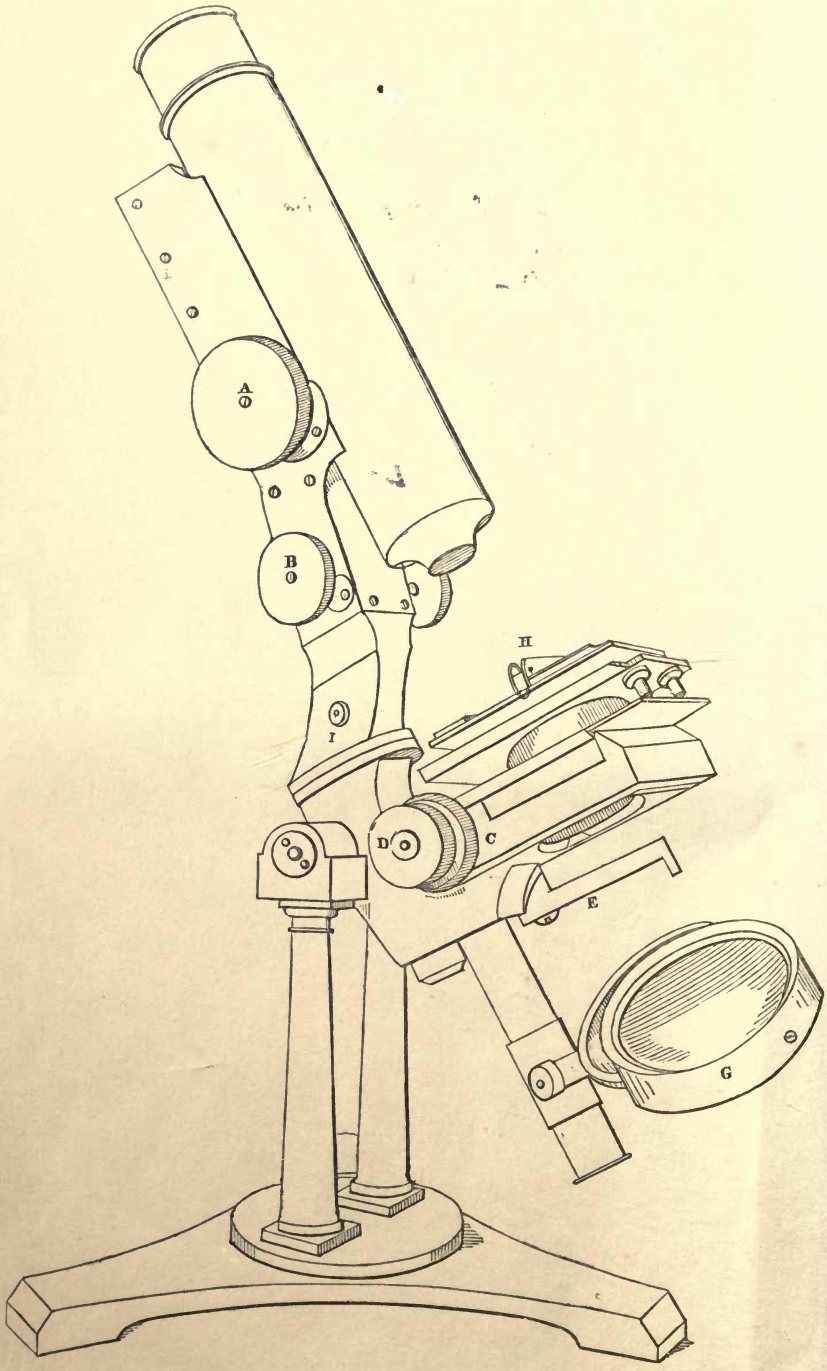


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THE

# MICROSCOPIC MISCELLANY;

BEING

## SELECTIONS

FROM THE

## MICROSCOPIC JOURNAL,

CONTAINING

THE MOST RECENT FACTS, AND IMPORTANT DISCOVERIES IN HUMAN AND COMPARATIVE ANATOMY, ZOOLOGY, BOTANY, GEOLOGY, PATHOLOGY, MEDICINE, ETC., DEVELOPED BY BRITISH AND FOREIGN MICROSCOPICAL OBSERVERS.

**With Illustrative Diagrams, by Joseph Dinkel.**

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EDITED BY

DANIEL COOPER,

ASSISTANT-SURGEON TO THE SEVENTEENTH LANCERS. FORMERLY IN THE ZOOLOGICAL DEPARTMENT OF THE BRITISH MUSEUM, ETC., ETC.

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TO

JOHN EDWARD GRAY, Esq.,

F.R.S., F.G.S., M.R.G.S.,

PRESIDENT OF THE BOTANICAL SOCIETY OF LONDON,
KEEPER OF THE ZOOLOGICAL COLLECTION OF THE BRITISH MUSEUM,
ETC., ETC.,

The following Pages

ARE MOST RESPECTFULLY INSCRIBED,

AS A HUMBLE THOUGH GRATEFUL ACKNOWLEDGMENT FOR MANY ACTS OF FRIENDSHIP AND KINDNESS RECEIVED AT HIS HANDS AND IN CONSIDERATION ALSO OF HIS HIGH ATTAINMENTS AS A NATURALIST,

BY HIS LATE ASSISTANT IN THE BRITISH MUSEUM,

THE EDITOR.

M356133

# ADDRESS.

THE MICROSCOPIC JOURNAL having now passed twelve months of its existence, the EDITOR, at the suggestion of many of the Subscribers, has resolved on doubling the number of its pages, which will, he trusts, in future enable him to cater to the tastes of the several classes of his readers with more advantage than he has been able hitherto to do. The various Sciences, now in a measure dependent on the employment of the Microscope for their elucidation, have become so numerous, that it is difficult at times to know how much of one, or how much of another to cull from the multifarious British and Foreign Journals, and Transactions of Societies continually on our table; and while the most important and interesting articles have received early insertion, those of comparatively less interest have obtained a place later in the day, owing to the hitherto limited extent of our pages. As this inconvenience will for the future be in a great measure obviated, we wish it to be generally understood that our pages will constantly be open to the insertion of all communications of standard merit, whether published at home or abroad, with the object of placing in the hands of the Microscopic Observer, all the important facts

which are scattered throughout numerous works and Proceedings of British and Foreign Societies, with a view to render the MICROSCOPIC JOURNAL a monthly periodical of importance and reference to every explorer and lover of Science throughout Great Britain. To accomplish this end, the EDITOR respectfully solicits a continuation of that support and assistance he has hitherto received from his Correspondents.

CHATHAM,
*22nd January*, 1842.

## XV.—OBSERVATIONS ON THE BLOOD DISCS AND THEIR CONTENTS.*

*By John Quekett, Esq., M.R.C.S., &c.*

The author, after briefly alluding to the great importance of the blood in the animal economy, and to the erroneous opinions which had been entertained respecting its globules or discs, then proceeded to state, that in his frequent examinations of the blood of the human subject, he has often been attracted by the curiously corrugated or mulberry-like appearance which many of the discs presented, and at first he attributed this change in form to the salt and water which had been used to dilute them with, previous to examination. The fluid consisted of five grains of salt to an ounce of water; whenever this was added to recent blood, the discs very soon assumed this mulberry-like character. The first effect produced on the addition of the saline solution was that of the discs becoming stellate; little points appeared first on their edges, and subsequently on their flattened surfaces as well, and after a time these points become rounded, and eventually each disc assumed a mulberry-like appearance, which gave him the idea of their containing small globules or granules in their interior, as ultimately proved to be the case. On one occasion, whilst examining some blood which had been diluted with salt and water, and having been prevented from watching it for a few minutes, he was surprised at the great number of small granules which had made their appearance during this interval, which led him to suppose, that these granules might have escaped from some of the red discs, and therefore watched to ascertain whether such was the case. After viewing them for some minutes, he distinctly saw for the first time, one or two of these little bodies escape suddenly from the interior of one of the discs, and this soon after was followed by a second, then a third, and so on, until six or seven had escaped. Numerous opportunities having since offered of verifying these observations, it has been found that from most of the discs six or seven of these little granules escape, some being emitted suddenly from the parent disc, whilst others merely make their escape at the edge, and there remain, giving the disc a beaded margin, whilst those, on the contrary, which were projected to some little distance from the parent, moved about the field

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* Read before the Medico-Chirurgical Society of London, March 23rd, 1841, and abstracted by the author.

of view as if they were animated, which fact will be again alluded to. It was subsequently found, that those discs which had given off these little granules from their interior, disappeared from the field of view, not suddenly bursting, but gradually getting more and more transparent, till no trace whatever of them was to be seen which was attributed to the solvent power of the salt and water.

Having proceeded thus far in his observations on the blood diluted with salt and water, his next endeavour was to prove whether these changes in any way depended upon the saline solution, and whether the same phenomena would occur in blood fresh drawn from the body, having no other fluid for the red discs to float in than its own *liquor sanguinis:* accordingly, some blood was taken from a small incision in his arm, and placed on a glass, and covered lightly with a thin piece of mica. At first no trace of spinous discs was to be observed; but after a few minutes they sprang up in all parts of the field of view, but their surfaces were not so much corrugated as when the saline solution was used, neither did the change from the ordinary disc to the spinous one go on so rapidly; but all the other phenomena were precisely similar to those which took place in the blood treated with salt and water.

By access to the splendid library of the Royal College of Surgeons, he has been enabled to ascertain what had been done by others; and it is curious to remark, how beautifully some of the observations of the oldest examiners of the blood can be confirmed and explained by what he has himself witnessed; and he likewise has found, that many things known and described by them, have been entirely overlooked by writers of modern date. Leuwenhoeck states, that each disc was composed of six smaller ones. Hewson knew that the discs sometimes assumed a mulberry character, and that the discs of the blood of the eel would sometimes split and allow the nucleus to escape; but he attributed these changes to putrefaction, and states, that human blood discs will become corrugated, and appear like mulberries when putrid serum is added to them. From this time down to within the last two or three years, these appearances have been nearly overlooked. Professor Schultz must have witnessed the escape of the granules from the red discs, but calls them air bubbles; he states, that the powerful contraction of the vesicular membrane, excited by the salt and water, caused the elastic fluid contained in the vesicles to be pressed out, and to escape in the form of air-bubbles,—his idea being, that a gas was contained in the interior of the vesicle around the nucleus. It has been stated in the preceding part of this paper, that some of the little granules, after their escape from the parent,

would take on a molecular movement. This fact must also have been noticed by Majendie, for in his Lectures on the Blood, published in the Lancet for 1838-39, he states, "that when blood was kept for 24 or 36 hours, the discs became puckered up, and besides this, a number of Vibriones or Monades appeared at the same time in the serum, which devour the red globules." Others have made mention of the corrugated discs, and of the little granules; but all have singularly failed in ascertaining their nature or their source; they have been described by authors under the names of lymph, chyle, and fibrin globules. Besides these and the red discs, other bodies are seen in the blood, which are much larger than the ordinary discs, and have been described by some observers as pus globules; whether so or not, they give off granules from their interior, but without becoming first spinous, like the red discs. The changes described have been found to take place more rapidly in the blood of some individuals than in that of others, and in the same individual at different times, the best subjects being those of an inflammatory habit of body. There is one essential thing to be borne in mind, which is, that the blood must not have been suffered to coagulate before examination; when this has commenced, and the discs have become aggregated together like piles of money, the changes before described will not take place. From the repeated observations of the author he arrives at the following conclusions: — That each red particle of human blood is a flattened circular disc, consisting of an outer membrane or envelope, with a thick gelatiniform fluid in its interior, which, under certain circumstances hereafter to be noticed, is capable of becoming granular, and of escaping from the envelope in the form of small globules, the general number being about six or seven for each disc: also, that the discs may present either a bi-convex or bi-concave figure, of which the latter form is by far the most numerous, which is in a great measure dependant upon the quantity of the gelatiniform fluid which they contain in their interior. The existence of a nucleus, as described by Hewson, Müller, and other observers, he has entirely failed in making out. At present he declines stating what he has ascertained these little granules (so often spoken of) to be; these, together with the important part they play in some of the effects of inflammation, as well as some other properties of the blood, will form the subject of another paper, which he hopes shortly to lay before the Society.

## NOTICE OF THE RESULT OF AN EXPERIMENTAL OBSERVATION MADE REGARDING EQUIVOCAL GENERATION. *

*By F. Schulze of Berlin.*

SINCE the question respecting *generatio æquivoca* has attracted the attention of naturalists, the developement of living organisms has never been observed in vessels from which all air had been expelled by boiling, and which had been hermetically sealed. The access of air has been regarded as a necessary condition for the primary formation of Infusoria from decomposing organic matter, so that the mere circumstance of covering an infusion with a stratum of oil, removed that condition. But the question still remained undecided,—If the access of atmospheric air, light, and heat to *infundirten* substances included of itself all the conditions for the primary formation of animal or of vegetable organisms? And, in this point of view new direct experiments were considered to be very desirable. The difficulty to be overcome, consisted in the necessity of being assured, first, that at the beginning of the experiments there was no animal germ capable of developement in the infusion; and secondly, that the air admitted contained nothing of the kind.

I filled a glass flask half full of distilled water, in which I mixed various animal and vegetable substances; I then closed it with a good cork, through which I passed two glass tubes bent at right angles, the whole being air-tight. It was next placed in a sand-bath, and heated until the water boiled violently, and thus all parts had reached a temperature of 212 F. While the watery vapour was escaping by the glass tubes, I fastened at each end an apparatus which chemists employ for collecting carbonic acid; that to the left was filled with concentrated sulphuric acid, and the other with a solution of potash. By means of the boiling heat everything living, and all germs in the flask or in the tubes, were destroyed, and all access was cut off by the sulphuric acid on the one side, and by the potash on the other. I placed this easily-moved apparatus before my window, were it was exposed to the action of light, and also, as I performed my experiments during the summer, to that of heat. At the same time I placed near it an open vessel with the same substances that had been introduced into the flask, and also after having subjected them to a boiling temperature. In order now to renew constantly the air within the flask, I sucked with my mouth, several times a day, the open end of the apparatus filled with

* From Jameson's Journal, Vol. 23.

solution of potash; by which process the air entered my mouth from the flask through the caustic liquid, and the atmospheric air from without entered the flask through the sulphuric acid. The air was of course not at all altered in its composition by passing through the sulphuric acid in the flask, but if sufficient time was allowed for the passage, all the portions of living matter, or of matter capable of becoming animated, were taken up by the sulphuric acid and destroyed. From the 28th of May till the beginning of August, I continued uninterruptedly the renewal of the air in the flask, without being able, by the aid of the microscope, to perceive any living animal or vegetable substance, although during the whole of the time I made my observations almost daily on the edge of the liquid; and when at last I separated the different parts of the apparatus, I could not find in the whole liquid the slightest trace of infusoria, of confervæ, or of mould. But all the three presented themselves in great abundance a few days after I had left the flask standing open. The vessel which I placed near the apparatus contained on the following day *Vibriones* and *Monades*, to which were soon added larger Polygastric Infusoria, and afterwards *Rotatoria*.

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## XVII.—ON THE DEVELOPMENT OF THE VASCULAR TISSUE OF PLANTS.*

*By E. J. Quekett, Esq. F.L.S., &c.*

In these observations it was shown that the membranous tube which forms the parietes of vessels, originates from a cytoblast or nucleus, in a manner similar to that described by Schleiden, in the formation of ordinary cells of a plant, from which, at first, it is difficult to recognise them; but in a short period they assume the usual elongated cylindrical form, and the cytoblast becomes absorbed.

Immediately after this state, and before the fibre becomes deposited, the contents of the young vessel, which appear to be gelatinous, become charged with innumerable granules, so small as not to allow light to be transmitted through them—looking as blackish dots, and just visible under very high magnifying powers. These granules possess the motion known as "active molecules," and after a short time, when they have become a little enlarged, they begin to adhere to the

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* Abstract of a paper read before the Microscopical Society of London, February 19th, 1840.

inner surface of the cylindrical cell containing them; and it appears that this direction can be in most instances resolved into the spiral form, even in those vessels in which when the fibre is perfect that form is lost from changes that have occurred since the primary deposit of the granules.*

The singular law of the spiral arrangement of the granules was mentioned as deserving some attention, being sometimes arranged in the direction of a right-handed screw—in other cases in the opposite manner; sometimes in a single screw—in others as a compound one; many fibres running to constitute the helix. It was considered not improbable that these granules possessed certain polarities, and that also the usual continued passage of electrical currents through the axis and branches of a plant may possess the power of determining the linear and spiral order of floating granules, somewhat as the electrifying of the particles of gold-leaf mixed with water causes them to assume a linear condition; but there can be no doubt that much in this matter is effected by the agency of the vital powers of the cell itself, controlled by the influence of the plant.

It had been conjectured by Schleiden (whose observations the paper was intended in a great measure to confirm) that a current existed between the gelatinous contents of the vessel and its wall, which preceded the formation of the fibre within, and gave to it the direction it afterwards took. This opinion was shewn to be not altogether correct, by the fact that the granules become separately attached to the inside of the vessel without any discernible distance from each other, beginning first at one end and proceeding gradually to the other; occasionally a vessel being found, in which part had the granules laid down in the spiral direction, and the other as yet without any adhering to the membrane,—the fibre elongating like a root by the materials for its increase being added always to the growing point.

The granules so attached, becoming nourished by the contents of the vessel, have the moniliform appearance they first present in a short

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* The author, at the period of reading this paper, had examined several specimens of plants in which it appeared that the spiral form was not peculiar to all, and that the granules were sometimes deposited at the commencement in the manner in which the fibre was found ultimately to obtain. This induced him to mention in the original paper, that each vessel had a peculiar arrangement of the granules for itself; but subsequent observations have led him to believe, that the spiral form more or less perfect is the type of all, which opinion is entertained by other vegetable anatomists.

period obliterated, and the fibre thereby obtaining a clear border which completes its development.

This act is one which is believed to be met with in all vessels at their origin, but is frequently modified in certain vessels afterwards—viz., in the *annular vessel*, according to Mohl, the rings of fibre in this vessel are formed by the union of one coil or coils of the fibre, in its early condition, and afterwards separating from the others, or adhering and becoming perfect rings in the interior of the vessel. In the *reticulated*, on various portions of the original spiral fibre, a granule becomes enlarged in the line, and forms the starting point for a branch of fibre, which connects the turns of the spiral together, in various portions, and in various directions. In the *dotted* and *scalariform* vessels, the fibres become so connected as to leave meshes or portions of the membranous wall of the vessel without any deposit within—and this spot so left, constitutes the *dot* in the former, and the *linear marking* seen on the walls of the latter. This dot is plain in all such kind of vessels, excepting those found in woody Exogens, where it possesses (from some slight difference of structure) a central mark, making it analogous to that on the woody tissue of coniferous plants, with which the author thought it identical in structure, and probably in function, but only of a smaller size.

The paper was illustrated with numerous diagrams representing the successive stages of the minute process described.

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## XVIII.—ON THE STRUCTURE OF THE MACULA LUTEA OF THE HUMAN EYE.*

*By Dr. Grube of Königsberg.*

THE yellow spot in the human eye is situated on that precise point of the retina which answers to the posterior point of the axis of the eye, and is, therefore, the only part of the retina in which the eye perceives with perfect distinctness (in *direct* vision) the figures represented on it; since the remaining surface serves, as is well known, only for very imperfect (*indirect*) vision. Of the structure of this yellow portion, which is so much more delicate than the rest of the retina, that, from its susceptibility of injury, it was for a long time conceived to be perforated, I have no precise knowledge. I have often examined it in the

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* From Müller's Archiv. fur Anatomie und Physiologie, Heft 1, p. 38, 1840. Translated by Mr. G. F. Richardson

most fresh state I could select, with a power of three hundred linear, but could never arrive at a satisfactory result; and, indeed, I usually found the structure of the retina in the human eye, to be far less distinctly recognizable than in the eyes of animals recently killed. This indistinctness of the objects I conceived to be attributable to the decomposition which so speedily attacks the eye, since, in animals also which have been two days dead, the structure of the retina is no longer distinctly to be seen. The eye is decidedly that part of the body in which traces of incipient decomposition first display themselves; the cornea in a few hours after death acquires a folded aspect, and the eye appears as if it had lost a great part of its humidity.

I recently had the opportunity, through the kindness of the Counsellor of Medicine, von Treyden, to examine the eye of a man who had died a few hours before of rupture of the spleen;—the results of this investigation were so decisive as to afford me the greatest possible surprise.

The retina adhered so firmly to the vitreous humour, that it was impossible to separate at least the greater portion of the latter, except by actual cutting with scissors; while, it is well known that soon after death a fluid usually collects between the retina and the hyaloid membrane, which renders the removal of the vitreous humour from the retina extremely easy. It was already perceptible to the naked eye, that the place of the yellow spot arose in a conical form, considerably above the surface of the retina. The size of this elevation I was unable to measure distinctly. I was, however, enabled, with a magnifying power of three hundred linear, to perform one entire turn of the screw of the micrometer, in order alternately to bring into focus the highest point of the yellow spot, and the surface of the retina lying beneath it.

With the view of preserving the object as entire as possible, I did not compress it strongly, but placed over it a very thin plate of glass a quarter of an inch in size, in order to level the conical elevation. The appearance which the yellow spot now presented most nearly resembled the shagreen formerly used by stationers for the covers of cases, &c. Elongated, rounded particles, gradually tapering towards the middle, and about one-fourth or one-fifth the size of particles of marrow (markkörperchen), arranged themselves together with great regularity on the remainder of the surface of the retina. They proceeded like radii towards the periphery of the yellow spot, became larger at that point, but less distant in their outline, and with them were associated the marrow-like particles of the remainder of the retina, in gradual transi-

tion. This point of transition (the circumference of the yellow spot) was not circular, but the marrow-like globules radiated rather farther in a star-like form at single points, which were not situated at regularly recurring distances. A complete measurement I was unable to effect.

I had the opportunity of submitting this observation to the Physician General, Dr. Linden, who expressed himself perfectly assured of its correctness. It appears to me to be so far important that it affords the means of a simple and mechanical explanation of the phenomenon, that a portion only of the retina, namely, that which answers to the posterior part of the axis of the eye, possesses the power of distinct vision.

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## Hints to Microscopists.

### II.—ON THE CULTIVATION OF VALISNERIA, CHARA, ETC., FOR MICROSCOPIC PURPOSES.*

*By Cornelius Varley, Esq.*

I OFFER the following remarks as the result of my experience to those microscopists desirous of preserving the different *Charas*, *Valisneria*, and *Hydrocharis*, or Frog bit; in all of which the circulation may be well observed.

In cultivating these plants, it is only requisite to take notice of the circumstances under which Chara naturally thrives, and to imitate them as nearly as practicable.

*Firstly.* The Chara tribe is most abundant in still waters or ponds that never become quite dry; if found in running water, it is mostly met with out of the current, in holes or side bays, where the stream has little effect, and never on any prominence exposed to the current. If the Chara could bear a current, its fruit would mostly be carried on and be deposited in holes; but it sends out from its various joints very fine long roots into the water, and these would by agitation be destroyed, and then the plant decays; for although it may grow long before roots are formed, yet when they are produced, their destruction involves the death of the plant. In order, therefore, to preserve Chara, every care must be taken to imitate the stillness of the water, by never shaking or suddenly turning the vessel. It is also important that the Chara should be disturbed as little as possible, and, if requisite, it must be done in the

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* In a letter to the Editor.

most gentle manner, as, for instance, in cutting off a specimen, or causing it to descend in order to keep the summit of the plant below the surface of the water.

*Secondly.* Imitate the freshness of the water, by having an extent of surface, which it is requisite to skim frequently, or suffer it to overflow by the addition of more water. These precautions being attended to, a clear bright surface is kept. It is also desireable to change a small portion of the water; but this should be done without agitation. The best vessels for cultivating this plant in, are either wide pans, holding three or four gallons, or glass jars a foot or more high; into these the Chara may be placed, either with clean water alone, or a little earth may be sprinkled over it, so as to keep it at the bottom, or the bottom may be covered one inch with closely pressed mould, in order that the water may be put in without disturbing it. On this lay the Chara, with a little earth over the lower ends, to fix it. By causing the water to overflow is the readiest way to skim the surface, though dipping out gently will do; but in all cases of pouring in water, hold something, such as a saucer or flat piece of wood, to receive the pouring, and make it spread instead of allowing it to descend at once on the surface. Pans in the open air, nearly full of water, will be kept in order by the wind and rain, only taking care to supply the deficiency, (the effect of evaporation) and to change some of the water, if it be considered necessary. The vessels kept in-doors have a film which is always forming on the water, and which requires to be frequently removed.

*Thirdly.* Imitate the equal temperature of its native holes, by sinking the pan a little within the earth; but, during frosty weather, keep the pan in-doors, and at the lower part of the house, as this situation is generally the most uniform in its temperature.

The Chara will live in any temperature above freezing, and grows quicker as the warmth increases; but above the earth, as outside of a first-floor window, it will not bear the daily difference between the mid-day sun and the cold of sun-rising.

The glass jars I keep within the house, as nearly uniform in warmth as convenient.

Similar care is requisite for Valisneria, but the warmest and most equal temperature is better suited to this plant. It should be planted in the middle of the jar in about two inches deep of mould, which has been closely pressed; over this, place two or three handful of leaves, then gently fill the jar with water. When the water requires to be changed, a small portion is sufficient to change at a time. It appears to thrive in proportion to the frequency of the changing of the water,

taking care that the water added rather increases the temperature than lowers it.

The natural habitat of the Frog-bit is on the surface of ponds and ditches; in the autumn its seeds fall, and become buried in the mud at the bottom during the winter; in the spring these plants rise to the surface, produce flowers, and grow to their full size during summer. In order to keep them for microscopic purposes, large pans, with earth at the bottom, will preserve them through the winter; and if left out of doors during the cold months, the pans should be sunk into the ground to preserve the buds from the extreme cold.

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## Extracts and Abstracts from Foreign Journals.

[From *Oken's Isis*, 1839.]

*Mandl* has discovered a new spermatic animalcule in man. It has a knot-like ganglion behind the head, while others seem to resemble the spermatic animalcules of the mouse. The seminal fluid was probably vitiated by indisposition.

*Doyère* observes as follows on an animalcule found in the sand procured from gutters in the roofs of houses, forwarded to him by Schulze:—It is not *Macrobiotus hufelandi*, though in some particulars it much resembles that animalcule; he however considers it to be the same in more advanced age, and to be identical with Spallanzani's *Tardigradus*, not so long but thicker than *Macrobiotus* (280,012 mill. meter); it has a somewhat substantial and red-brown skin, and a head with two obvious pairs of appendages like antennæ. The body consists of four rings, each having a pair of feet attached, and three rings, with a pair of long threads or spines on the upper ring. The feet are jointed, and have four equal claws—not two divided ones like *Macrobiotus*. The proboscis is protrusible, and consists of three portions; the points of the jaws are not bent but straight.

Among the same sand were many smaller individuals of *Macrobiotus*, probably younger ones; they had only three claws on the feet, of which two were simple and one divided. This is probably the *Trionychium* of Ehrenberg.

*Turpin* states that in the yeast of beer the so-termed slime actually consists of small Fungi, in a state of vegetation, including *Mycoderma* (Hygocrocis) *cerevisiæ*, *Torula cerevisiæ*. Fermentation is a kind of vegetation of these plants in water. *

*Morren* on the structure of *Agaricus epixylon*:—The colouring matter presents characters different from those of the flowering plants. There is no skin on the covering of the Fungi. The tissue is similar to that of flesh, and consists of a net of long transparent vessels, which, on

* A translation of Turpin's paper will be inserted entire in a future number.—Ed.

the whole, appear altogether of a full blue colour, but under the microscope present only here and there blue globules, $\frac{1}{300}$th of a millimetre in size. They are not altered by death. The fungi cannot, therefore, be reckoned among cellular plants.

In Agaricus epixylon there are no single cells. The tissue consists of anastomosing vessels, commonly furcated, occasionally three cornered—sometimes jointed, with young branches proceeding from the joints. The tubes are often united by a cross band like the letter H. The *vasa laticifera* most nearly resemble these. This structure is common to all Fungi. Thus it is a regular branched vascular structure.

The *vasa laticifera* are simple elementary organs which form together the circulating apparatus of plants. The tissue of the Fungi is distinguished by the felt-like structure, and by the want of circulation, at least during great part of their existence, as well as by the minute globules in the fluid. This last fact is characteristic of the Fungi.

*Milne Edwards on the Breathing Organs of Oniscus and Tylos.*—In the latter of these, the large transverse foleaceous appendages of the abdominal feet, have on the lower side a series of eight or nine air-holes, through which the air passes into as many small organs of breathing, which lie in the long foleaceous vesicles, the surface of which is full of tubular and ramose elongations. These float in the chyle of the animal, and assume an intermediate form between the respiratory organs of the spider and the air-tubes of the carp. In *Oniscus* and *Porcellio*, the anterior leaves of the first two pair of abdominal feet, have several irregular apertures beneath the hinder margin, observed by Latreille, respecting which Edwards has shown, that the air penetrates through them to a branched organ in the interior of the appendage, as in Tylos. A classification of the crustacea, founded on their respiratory organs, would, therefore, not be natural.

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[From *Valentin's Repertorium*, 1840.]

*Stiebel on Lysogonium tænioides.*—This creature, found by Stiebel in the deposit of certain mineral springs, is thus described by him: — It appears under the microscope as a very long articulated body, enveloped by a mucoid or transparent covering, the articulated portions being connected together by a straight band or muscle running along on both sides. Each portion is divided by a transverse canal, running between and below the mucoid envelope, and which has a small opening close to the straight muscle before-mentioned. The extremities of the body are oval-shaped, and the creatures are aggregated in bundles, adhering together by means of a sort of slime. Sometimes one of the bodies projects beyond the mass, or moves in an oscillating manner. At its anterior extremity (which contains less granular matter), a distinct articulated head is seen, having a dark notch laterally, which is the mouth; this opening, when viewed dorsally, as it were, appears triangular, and from which a proboscis is sometimes seen to emerge. A delicate triangular appendage or *feeler*, is seen projecting on each side (or

even two on each side), especially on the smaller creatures, which consist of only one or two articulated pieces. The proboscis is provided with muscles, proceeding from the main lateral ones, and both at the anterior and posterior extremities of the body, placed upon small pedicels, to which a delicate black nerve is seen running, black eyes are visible. Each articulated portion is round, and provided with a black, often zig-zag formed nervous fibre, and contains vesicles and granules of various sizes. A black stomach and delicate intestine is also to be found. Propagation is effected by self-division or separation of the articulated portions.

*Nasse on the Nerves of Frogs*—The appearance of the nerves of a frog, which had been kept for a whole year without nourishment, and in which emaciation was considerable, was quite normal. The fibres of the ischiatic gave, as the ratio of thirty-six measurements, 0,000367″. In a healthy frog, the ratio of thirty measurements of the fibre of the ischiatic, was 0,000374″.

*Fricke* has observed species of *Acephalocystus* in the bones of the Pelvis of a man sixty years of age. *Estlin* species of *Cysticœcus* between the conjunctival and sclerotic coats of a girl six years old; and *Gervais* makes mention of an *Echinococcus* being found in a Simia.

*Glüge* has examined, microscopically, *ramollissement* of the brain. According to him, in that kind of ramollissement where the softened portion is devoid of colour, and which is comparatively rare, the primitive nervous fibres are broken up, and contain sometimes a small quantity of pus, and fewer of the small bodies or granules which are observed in the *red* softening. These last are considered by Glüge as analogous to what he calls his *globules of inflammation;* whilst Valentin looks upon them as approaching to the particles of the general pigment of the body, though, nevertheless, differing from them. According to Glüge they can be demonstrated within the capillary vessels of the substance of the brain itself. Extravasation of blood may cause, ramollissement in two ways,—first, in a purely mechanical manner, and secondly, by the absorption of its coloured serum.

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[*From the Revue Zoologique*, 1840.]

*Bourjot on the Structure of the Eye of Hirudineæ.*—At the Philomatic Society of Paris, 26th March, 1840, M. Bourjot endeavoured to prove that the structure of the eye in Hirudineæ, is complete, inasmuch as it consists of a choroid coat and a perfectly round crystalline lens, as is the case in all animals which live in water. Thus, contrary to the opinion of M. de Blainville, and the doubt expressed by M. Moquin-Tendon, in the Monograph of Hirudineæ, M. Bourjot establishes, that the eyes of the common *Nephelis*, and of *Clepsina punctata*, which approaches near to Planaria, and with greater reason to the higher order Hirudineæ, have eyes appropriately adapted for vision.—*p.* 120.

*Milne Edwards on the Spermatophora of Cephalopods.*—The spermatophora are bodies discovered by Swammerdam and Needman in the male organs of Cephalopods, and which, when they are removed from the membranous pouch where they are arranged side by side, exercise some degree of motion, change their form and soon burst. M. M. Edwards and Peters have observed them in several Cephalopods, and give, as the result of their researches on these singular bodies filled with spermatic animalcules, that they are instruments of fecundation of a new description altogether, having their analogues in the fecundating corpuscules of the grains of the pollen of plants, which burst when they come in contact with the female organ (stigma) of the flower.—*p.* 153.

*Guillot on the Acephalocysts of the human body.*—At the Philomatic Society of Paris, June 13, 1840, M. Natalis Guillot, made known the results of his observations on these bodies. He explained the development of vessels on their walls, their communication with the neighbouring parts, and the transformation of the *Acephalocysts*, into *true cysts*, provided with vascular parietes.—*p.* 180.

*Laurent's researches on Spongilla fluviatilis.*—At the Philomatic Society of Paris, June 19, 1840, he endeavoured to prove that four kinds of reproductive organs existed in this species, viz.:—1. *Oviform bodies*, already known, ejecting a glutinous substance they contain, and in which no silicious spicula are found at the moment of expulsion from the egg.—2. *Gemmiform bodies*, very imperfectly known in Spongilla, called by Dr. Grant *ovules* (in sponges) which, at the moment they detach themselves from the tissue of the parent to float about, have silicious spicula in a part of their substance.—3. *Proteiform bodies*, which detach themselves from young Spongillæ, a few days after they have become fixed, and after having slowly moved for an indefinite period, fix and become developed. These bodies never contain silicious spicula at the moment of separation from the young parent.—4. *Tuberculiform bodies*, which may be seen to shoot out from different points of Spongilla, and die without producing either of the three above-named reproductive bodies. At the period they are given off, they never contain silicious spicula. These four reproductive organs of Spongilla are, however, reducible to three principal kinds, known by the names of *eggs* (oviform bodies), *gemmæ* (gemmiform bodies, which are ultimately free gemmæ, and tuberculiform bodies regarded as fixed gemmæ), and lastly *fragments* or the proteiform bodies which naturally separate from the parent.—*p.* 190.

*M. C. Mylius on Uric Acid in the Excrement of Snails.*—M. C. Mylius of Berlin has discovered, that the excrement of snails always contains uric acid. According to his experiments, this acid is secreted in a solid form by a glandular organ, situated directly beneath the shell, forming, without doubt, the urinary organ. This matter, which is of a white colour, is easily seen in the transparent skin. To collect it, cut the organ, and the matter escapes, which partakes of the consistence of paste or bouillie. When it is collected from a number of snails, agitate

it in water; this separates the albumen, while the uric acid is deposited, presenting, not a crystalline form, but a soft powder, like that of Lycopodium. The granules of this powder present, under the microscope, a spherical, transparent, and variable size, the largest measuring 0.00014″, the smallest 0.00006″, and the mean 0.00010″ of an inch. A grain and three quarter of uric acid may be obtained from a common snail.

Mylius has met with this acid in *Helix nemoralis* and *H. hortensis*, but has never been able to meet with it in the genera *Lymneus* and *Planorbis*. The acid is neither combined with ammonia or any other alkali, but is secreted in a state of purity by the secreting organ.—*January*, 1841.

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## PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

*May 27th*, 1841.—*Professor Owen, F.R.S., &c. President, in the Chair.*

After the preliminary business of the meeting, the Secretary proceeded to read a paper from Dr. Haro of Metz, being "Observations on the production of Infusoria;" but as the author did not appear to be aware of what had previously been done by other philosophers connected with the history of the subject, we content ourselves with giving only the conclusions arrived at by the author, viz.—1. That the air is not in all cases the vehicle of the germs of true animalcules. 2. That substances in a state of putrefaction, only contain animalcules when in contact with other substances in which they already exist, and that they are not developed, except under certain circumstances. 3. That decomposition of organic matter only gives birth to rudimentary species, *Vibriones* and *Monades*, which, generally speaking, are not animals; and that if true animalcules can be observed in them, these can only be regarded as larvæ deposited in their substance by minute insects flying in the air, such as occur in the vibrios of paste and vinegar; that, consequently, there is not here any spontaneous generation, properly so called. Finally, that all other particles are rudimentary crystalline atoms, which are detached from organized bodies under decomposition, and are put in motion by electrical forces, until the aggregation of the molecules constitutes them solid bodies, under the form of the crystals which the substance affects to which they belong.

The most important fact detailed by Dr. Haro was, as Dr. Arthur Farre observed, the test for discovering the presence of albumen and fibrin, should it prove on repetition to be correct. Dr. H. states, that when *albumen* is subjected to decomposition in water *Monades* are produced; and, on the contrary, when *fibrin* is so treated, *Vibriones* are the animalcules met with in the fluid.

Professor Owen also made some remarks on the communication, in which he stated that the author could not have been acquainted with the previous researches of Professors Ehrenberg, Schultz, &c., and that

the question involved the animality of *Monades* and *Vibriones*, bearing more particularly on the question of spontaneous generation as restricted to Entozoa and Animalculæ.

The meeting then resolved into the conversazione and examination of objects.

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## Microscopical Memoranda.

*Mandl on the Relations which exist between Blood, Pus, Mucus, and Epidermis.*—The general conclusions arrived at by the author in his memoir read before the *Société Medicale d'Emulation, June 3rd,* 1840, are as follows : — 1. The fibrinous globules of the blood, the globules of mucus, and those of pus, are identical. 2. All the globules are the product of the coagulation of the fibrin in the serum, which has transuded through the walls of the blood-vessels. 3. The liquid in which the globules swim constitutes the difference between pus and mucus. 4. If the fibrinous globules remain fixed to the surface of the membrane, where they are secreted, they become the nuclei of epidermoid cellules, which constitute the elements of the epidermis. 5. If, on the contrary, the fibrinous globules remain free on the surface of the membrane, they are expelled by the organism, and form an element of pus and mucus. 6. These two elements are simply filtered blood; that is to say, they contain all the elements of the blood, except the globules; the serum at the same time undergoing chemical alterations. — *Gaz. Med. de Paris, July* 1840, *in Brit. and For. Med. Rev. Jan.* 1841.

*Locality for Craterium pyriforme.*—This beautiful microscopic Fungus, which was first noticed by Mr. C. G. White on flint stones in an old gravel pit at Old Ford, near Bow, Middlesex, is now to be found most abundantly on the gravel pebbles on the banks of the South West-India Dock, and no doubt in other localities at this season. They are not restricted to pebbles only, nor found on every stone, but appear chiefly on the South Western aspect.—*Edward Stock, Poplar, June* 15, 1841.

*Death of M. Turpin.*—It is with much regret we record the death of this distinguished microscopic observer and draughtsman. His remains are deposited in Perè la Chaise, Paris. In a future number we intend inserting an abstract of his researches, and further details connected with the life of this illustrious observer.

## XIX.—NOTICE OF THE ANIMALCULES OF THE RED SNOW.*

*By Dr. C. Vogt.*

THE researches of Mr. Shuttleworth, published in the *Bibl. Univ.* 1840, on the colouring matter of red snow, show, that the red-coloured snow of our Alps is not solely vegetable, but that it contains a great number of animals. But the observations of this botanist, although very exact, have not since been repeated a sufficient number of times, nor in a sufficient number of localities, to view them otherwise than the first steps towards facts, which throw a new light on the study of the microscopic Fauna. A number of details remained for further investigation, and as M. Agassiz made a prolonged visit at the glacier of the Aar, we took with us Ehrenberg's great work on Infusoria, and two microscopes, with a view to study the red snow in a fresh state, and to compare the same from different localities, wherever it was to be met with. The results we have obtained are by no means unimportant, as regards the new and curious forms that we have discovered, and the observations we have made on their mode of life, and the facts connected with the development and reproduction of these extraordinary beings, of which their presence in the midst of the eternal snow is in some manner a *dementi* given to the general ideas which are admitted on the conditions of the existence of organic beings. The circumstance which surprised us more than all, was the diversity of form exhibited by individuals collected from various localities. It is probable that each station possesses beings proper to it, associated with a certain number of other types more generally distributed.

The red snow was found this year (August 1840) in great abundance on the glaciers which descend in the valley of the Aar. We also observed it at the extremity of the glacier of Oberaar, on the glacier of Finsteraar, on the plains of snow which border the west flank of Siedelhorn, and in numerous points of the lower glacier of the Aar, between others near to that of Abshwung, in the neighbourhood of the hotel of Neuchatelois, near the crystal grottoes, on the lower glacier of Grindelwald, &c. The following are the organisms which we met with in these situations :—

1. The Infusoria called *Astasia nivalis* by Shuttleworth, see the 3rd

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* From the Bibl. Univ. de Geneve, 21st May, 1841.

fig. in his plate. It is easily distinguished by its pyriform shape, and the rapidity of its movements. With the exception of the very small white vesicles, situated in the interior of the body, which look like stomachs, Shuttleworth has not given a description of the structure of the animalcule. Numerous observations have satisfied me, that it is enveloped in a carapace which encases the whole, and is only open at the anterior extremity. This opening is furnished with numerous small cilia, serving both as organs of locomotion and prehension. It is doubtless at this point that the mouth is situated, the position of which is indicated by an orange-coloured tint, which is clearer than the rest of the animal. The presence of the carapace together with the cilia, are characters which do not allow this animal to be placed with Astasia, as Shuttleworth has done; on the contrary, it ought to be placed in the family Peridinia, which Ehrenberg thus characterizes: *Animal distinctly, or to all appearance polygastric, without intestinal canal, having a carapace, with hairs or cilia scattered over the body, or on the carapace, often in the form of a girdle or crown, provided with a single aperture in the carapace, and furnished with vibratile organs.* It ought, otherwise, to be regarded as the type of a new genus, characterized by the absence of a groove in the carapace, and also that the stiff hairs are replaced by soft cilia, which is not found in any other genus of the family.

2. The *Gyges Sanguineus* of Shuttleworth, see his fig. 4. I will add, to complete the description given to this animal by the author, that I have frequently noticed, in those individuals in motion (Shuttleworth could only have seen dead individuals), the orange-coloured organs occupied the space between the carapace and the body, and which I believe to be the retractile lips *(lèvres.)* The animal moves slowly, although directed in every case. But that which distinguishes it above all, is its mode of reproduction; it gives off from several parts of its body small transparent buds, apparently vesicular, and for the most part filled with a *grenue* substance. As they enlarge, they are detached more or less from the body of the animal; sometimes two bodies of equal size, of which one is red and carapaced, and the other quite colourless, adhere by a very narrow point of attachment. By degrees this bud completely detaches itself from the parent body, and appears under the form of a colourless infusory animal, such as Shuttleworth has represented in his 7th and 8th fig., which approaches to *Pandorina hyalina* Ehr. I could not discover in these offsets anything beyond that which Mr. S. has already seen; they are perfectly motionless; their contents apparently *grenue*, become coloured by degrees from green to yellow, orange, and even a deep red, whilst the covering remains colourless, and is

converted into a carapace. It is at this point only that the motions of the animal become visible. I had the good fortune to observe, and to be able to make drawings of the various grades of this mode of reproduction, and I am convinced that this animal, far from belonging to the genus *Gyges*, on the contrary, ought not only to be looked upon as the type of a new genus, but still further, to constitute a family, on account of its very peculiar mode of reproduction and development.

3. I place in the genus *Gyges* of Ehrenberg another infusoria, of an equally remarkable form, which does not appear to have been observed by Mr. Shuttleworth. In the red snow may be occasionally seen globular organisms, containing in their interior from two to five individuals, enclosed in a carapace apparently of a vitreous character. The colour of these animals, thus living in the same case, is of a dark red; they frequently adhere one to the other, and arrange themselves in the form of a cross; they are also frequently separate. The small individuals, probably the young, were of a clear yellow hue; I could not observe the slightest motion in them.

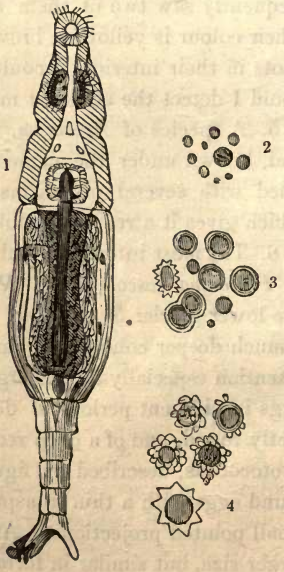
4. An infusoria of the family of *Bacillaria*. It is very abundant in the red snow, and is the smallest of all the kinds I have met with. We frequently saw two of them adhering together, and ready to separate. Their colour is yellowish brown. With the exception of a few bright spots in their interior, I could not distinguish their structure, neither could I detect the slightest motion.

5. A species of *Aretiscon*, having two hooks to the feet. This animal, known under the name of *Macrobiotus*, has usually the intestine filled with several organisms met with in the red snow, and is that which gives it a red hue, whilst its natural colour is a light brown.

6. The most interesting animal of the red snow is a Rotifer, a variety of *Philodina roseola* Ehr. We met with it abundantly in the snow of the lower glacier of the Aar. Having remarked that the ovary was of a much deeper colour than the other parts of the body, I directed my attention especially to this organ, and I was not long before I perceived eggs in different periods of development. The young eggs were perfectly round, and of a deep red hue, absolutely similar to the globules of Protococcus, described and figured by Shuttleworth, in his fig. 2. I also found eggs with a thin transparent covering, furnished on all sides with small pointed projections. After a time others were also observed, of a larger size, but similar in form to those figured by Ehrenberg, and ready to be deposited. The great similarity of the immature eggs with the globules of Protococcus figured by Shuttleworth, attracted our attention, so much so, that at the moment the idea suggested itself, that these

globules were generated by the Philodina, and are to be found in the glandular appendages of the intestines. To assure myself of this, I fed some Philodinas with indigo, and by this I distinctly ascertained that the globules in question were situated exterior to the intestinal canal. But as very many of these same globules were found isolated in the snow, it became a matter of doubt whether those were the eggs of Philodina, or really those of Protococcus. I soon found the solution of this problem, by observing one of the Philodinas in the act of voiding the eggs; from that time it was evident that these animals do not always deposit eggs fully formed, but that they give out occasionally some not perfectly developed, and these are doubtless the globules, which, up to the present time, having been considered as those of Protococcus, are really animal organisms, the eggs of Philodina. When they are of a rosaceous tinge, I look upon them as winter-eggs, analogous to those of many of the Rotiferæ, which Ehrenberg has figured at their full development. I afterwards met with these several forms of eggs together with the Philodina, in the crevices of a polished rock below the glacier of Rosenlain, in the vicinity of Guttannen, and even on the borders of the lake of Neuchâtel, where the *Philodina roseola* with coloured eyes is very abundant.

After what has been stated, if there really exists Protococcus independently of these eggs (which does not appear to me likely, at least in the red snow of the Alps), it must prove that their identity is such, as to be mistaken the one for the other. Future researches may probably elucidate their distinguishing characters; for M. Joli, in his work on the salt-water ditches of the south of France, regards equally as Infusoria, those microscopic bodies which Turpin determined as belonging to the genus Protococcus.




In the accompanying figure, 1, the *Philodina rosea* * of the red snow, with the different forms of its eggs, is seen magnified 360 diameters. The animal is

* The animal is here represented only *one half* the size as in the original plate,—the eggs are the full size.

seen from above, the body extended as in the ordinary act of progression on the bottom or side of the vessel in which it is kept. The three principal regions of the body are very distinct: 1. The head and neck, with the different organs of sense, and the commencement of the digestive system; 2. The trunk, which is nearly cylindrical, and is enveloped in a furrowed cutaneous carapace; 3. The articulated feet.

The anterior extremity, with its cilia, is expanded as in the act of touching; the rotatory organs are contracted: a little posterior to these may be seen in the median line, the respiratory tube, which is equally contracted, when spread out, it is much longer, and is furnished at its extremity with stiff cilia. Behind this tube the eyes are met with, which are obliquely placed; they are colourless in the variety from the Alps, whilst they are red or yellow in the common variety. Next comes the pharynx, with its two teeth, from whence the intestinal canal proceeds, which, in the figure given by Dr. Vogt, is of a blue colour, the animal having been fed on indigo. The intestinal appendages are distinguished from the ovary by their intense red colour. The foot, capable of expansion and contraction, is also seen. It is composed of seven rings; the fifth and sixth are armed with two points, the seventh is furnished with two claws, very much analogous to the posterior feet of the *Chenilles*. On either side of the body may be seen, in four different places, the organs which Ehrenberg described as vibratile branchiæ, but which in reality are nothing more than enlargements of two lateral vessels given off from the respiratory tube, and furnished with cilia. Similar vibratile enlargements are seen at the union of the neck with the body, in two situations in the middle of the body, and one at the side of the anus. The head and neck, as well as the feet, may be withdrawn into the coriaceous carapace of the body, which is susceptible of considerable dilatation and contraction. Fig. 2 represents those imperfectly developed eggs which have been mistaken for Protococcus. Fig. 4 shows the form of the winter-eggs not developed, with the covering in the form of a rosette; both the one and the other are met with in red snow. Fig. 3 represents an accumulation of the ordinary eggs of Philodina, collected from the crevices of the polished surface below the glacier of Rosenlain; the number is by no means limited.

The red snow of the upper glacier of the Aar and that of Siedelhorn, furnished us with Philodinas and eggs of different forms, similar to Protococcus. The lower glacier, and that of Finsteraar, presented us with all the organisms noticed in this communication.

## XX.—EHRENBERG'S CONCLUSIONS ON THE ORGANIC COMPOSITION OF CHALK AND CHALK MARL.*

1. MANY, and probably all, *White Chalk Rocks* are the produce of microscopic coral animalcules, which are mostly quite invisible to the naked eye, possessing calcareous shells of $\frac{1}{24}$ to $\frac{1}{288}$ line in magnitude, and of which much more than one million are well preserved in each cubic inch, that is, much more than ten millions in one pound of chalk. †

2. The *Chalk Marls* of the Mediterranean Basin are the produce of microscopic Infusoria, possessing silicious shells or cases, mostly quite invisible to the naked eye, intermingled with a small proportion of the calcareous animalcules of the chalk.

3. The peculiar state of aggregation in *White Chalk* does not arise from a precipitate of lime previously held in solution in the water of the sea, nor is it the result of the accumulation of the small animalcules, but it proceeds from a disintegration of the assembled microscopic organisms into much minuter organic calcareous particles; the reunion of which into regular, elliptical, granular laminæ, is caused by a peculiar crystalloid process, which may be compared to crystallization, but is of a coarser nature, and essentially different from it. The best writing chalk is that in which this process has been developed to the greatest extent.

4. The compact limestone rocks, which bound the Nile in the whole of Upper Egypt, and extend far into the Sahara or Desert, being neither white nor of a staining quality, as well as the West Asiatic compact limestone rocks in the north of Arabia, are, in the mass, composed of the coral animalcules of the European Chalk. This affords a new insight into the ancient history of the formation of Lybia from Syene

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* Extracted from Mr. Weaver's View of Ehrenberg's Observations on this subject in the Annals of Natural History for June, 1841, p. 305.

† It is to be understood that I speak only of such Polythalamia as are well preserved, wholly disregarding their fragments. Of the well preserved there are contained in one-fourth part of a cubic line, or in one-twelfth of a grain of chalk, frequently 150 to 200 in number, equal to 600—800 in each cubic line, or 1800—2400 in each grain, and from 1,036,000 to 1,382,000 in each cubic inch; and hence in one pound of chalk the number far exceeds ten millions.

The larger Polythalamia and Bryozoa of the Chalk are best obtained from the sediment produced by brushing the chalk under water; the entirely microscopic forms remain long suspended in water.

to the Atlas, and of Arabia from Sinai to Lebanon, thus opening a large field to organic distribution.

5. Many of the chalk-like formations bordering on the Mediterranean in Sicily, Barbary, and Greece, really belong to the period of the European chalk-formation, as proved by their organic contents, although commonly held to be different from the chalk, and considered as tertiary. *

6. The chalk-beds of the south of Europe, around the basin of the Mediterranean, are distinguished from those of the north and east of Europe, by numerous well-preserved chalk animalcules, and less numerous inorganic laminæ; while in the north and east of Europe these relations are reversed. †

7. In the south of Europe the beds of marl which alternate with the chalk, consist of silicious shells of Infusoria, and flints are wanting; while in the north of Europe beds of flint alternate with the chalk, and marls with Infusoria are wanting. This exchange of character tends to explain the peculiar relation of flint to chalk, indicating that the pulverulent silicious particles of Infusoria have been converted into compact nodules of flint.

8. It has been lately remarked, that the chalk which contains flint is deficient in numerous silicious Infusoria, when compared with the Bilin slaty Tripel, or polishing slate *(Polirschiefer)*, containing semi-opal; but this deficiency now disappears, and a rich substitute takes its place, the Infusoria in the north of Europe having been employed in the formation of flints; while in the south, remaining unchanged, they are preserved in the Infusoria marls.

9. The chalk animalcules most resemble those of the sea-sand and the Miliolites, which, up to the present day, have been ranged among the Molluscs with the Cephalopods; but neither of these are either Cephalopods or Molluscs, nor even Infusoria, as asserted by a late observer; but they are Bryozoa, animals of Moss-corals, which are most nearly related to Flustra and Eschara.

10. The sea downs of some, and probably of most coasts, are still in

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* In Sicily, however, there occur many breccias of chalk, which have suffered a subsequent change, and may be referred to the tertiary epoch.

† Thus in the white and yellow soft writing chalk of the north of Europe, the inorganic crystalloid portions sometimes equal, or rather exceed in mass the organic remains; but in the south of Europe, in Sicily, these organisms, with their fragments, are greatly predominant, consisting, as it appears, exclusively of well preserved Polythalamia.

course of formation by living Bryozoa, which, though very small, resembling grains of sand, are yet, for the most part, larger than the chalk animalcules, and a large proportion of the sand of the Lybian Desert has been proved to consist of such grains. It is only in Nubia above Syene that the desert sand becomes a pure detritus of granite. *

11. In the various countries of the earth in which occur white and earthy, as well as coloured and compact rocks, composed of microscopic calcareous animalcules, the genera and species of these animalcules present so striking an agreement with those of the white chalk of Rügen, that they may well be deemed characteristic of one and the same period of geological formation. It cannot be asserted for a certainty, that the same forms have been observed anywhere else.

12. In the beds adjacent to, and more ancient than the chalk, namely, in those of the Oolite and Jura limestone formation, we have also clear evidence of the existence of other microscopic Polythalamia. These, however, are such as have not hitherto been found anywhere in the chalk.

13. The early assertion that *all* limestone was the produce of animals,† though resting on no sufficient foundation, and therefore justly held in slight regard by modern geologists, yet now deserves every attention, since it clearly appears that a limestone formation widely extended on the surface of the earth is composed of microscopic animals, visibly converted in a gradual manner into inorganic chalk and compact limestone. If similar phenomena appear also in the Jura limestone formation, and should become still further confirmed, these considerations (combined with the long-known existence of coarser corals and shells in both formations), tend to show how necessary it is, when examining the composition of any considerable portion of the solid mass of the earth, to strengthen our natural senses by artificial means, in order to obtain a distinct knowledge of the extent to which organic life may have contributed to its production.

14. The extreme minuteness of the chalk animalcules is strikingly proved by this, that even in the finest levigated whiting, multitudes of them are still present, and may be applied, without suffering change, to the most varied technical purposes ; thus in the chalk coating given to painted chambers, paper, or even glazed visiting cards (when not coated with white lead alone), may be seen a pretty mosaic of well-

* On these very interesting and not easily-developed relations, I hope, at a future day, to be able to make a more special communication.

† By Linnæus in 1745 and 1748, and Buffon in 1749.

preserved Moss-coral animalcules, but which are invisible to the naked eye; and thus our natural vision receives from such a surface the impression of the purest white, little dreaming that it contains the bodies of millions of self-existing beings, of varied and beautiful forms, more or less closely crowded together, as in Plate IV. of Ehrenberg's work, where the subjects are magnified 300 times.

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## XXI.—MEMOIR OF THE LATE FRANCIS BAUER, ESQ., F.R.S., ETC.

At the Anniversary Meeting of the Linnæan Society on the 24th of May 1841, the Bishop of Norwich, President, alluded, among others, to the death of this distinguished Microscopic Observer, an account of which we extract from the Proceedings of that Society :—

Francis Bauer was born at Feldsberg, in Austria, October 4th, 1758. His father, who held an appointment as painter to Prince Lichtenstein, died while he was yet a boy, and the care of his education devolved upon his mother. So early was his talent for botanical drawing manifested, that the first published production of his pencil, a figure of *Anemone pratensis*, L., is appended to a dissertation by Störck, "de Usu Pulsatillæ nigricantis," which bears date in 1771.

In 1788 he came to England, in company with the younger Jacquin, and after visiting his brother Ferdinand, who was then engaged in completing the beautiful series of drawings, since published in the "Flora Græca," was about to proceed to Paris. But the liberal proposals made to him by Sir Joseph Banks on the eve of his intended departure, diverted him from this resolution, and induced him to remain in England, and to take up his residence in the neighbourhood of the Royal Garden at Kew, in which village he continued to dwell until the termination of his life.

It was the opinion of Sir Joseph Banks, that a botanic garden was incomplete without a draughtsman permanently attached to it, and he accordingly, with the sanction of his Majesty, fixed Mr. Bauer in that capacity at Kew, himself defraying the salary during his own life, and providing by his will for its continuance to the termination of that of Mr. Bauer. In fulfilment of this engagement with Sir Joseph, Mr. Bauer made numerous drawings and sketches of the plants of the garden, which are now preserved in the British Museum. A selection from his drawings was published in 1796, under the title of "Delineations of Exotick Plants cultivated in the Royal Garden at Kew," and this was intended to be continued annually: but no more than three

parts, consisting wholly of Heaths, and containing thirty plates, were published.

In the early part of 1801, Mr. Bauer made for Mr. Brown, who had then been for some years engaged in a particular study of the Ferns, drawings of many genera of that family which Mr. Brown regarded as new. His drawings of *Woodsia*, made some years afterwards, were published in the 11th volume of our Transations, in illustration of Mr. Brown's paper on that genus. At a later period he again directed his attention to that tribe of plants, his labours in which have within these few years been given to the world in Sir William Jackson Hooker's "Genera of Ferns." The 13th volume of the Linnæan Transactions is enriched with his elaborate drawings, accompanying Mr. Brown's memoir on *Rafflesia;* and the part published last year contains a paper by Mr. Bauer "On the Ergot of Rye," from materials collected between the years 1805 and 1809.

The plate which accompanies the last-mentioned paper is derived from drawings which form part of an extensive series in the British Museum, illustrative of the structure of the grain, the germination, growth and development of wheat, and the diseases of that and other *Cerealia*. This admirable series of drawings constitutes perhaps the most splendid and important monument of Mr. Bauer's extraordinary talents as an artist and skill in microscopic investigation. The subject was suggested to him by Sir Joseph Banks, who was engaged in an inquiry into the disease of Corn known under the name of "Blight," and the part of Mr. Bauer's drawings which relates to that disease was published in illustration of Sir Joseph's memoir on the subject, and has been several times reprinted with it. Mr. Bauer has himself given, in the volume of the "Philosophical Transactions" for 1823, an account of his observations on the *Vibrio Tritici* of Gleichen, with the figures relating to them; and another small portion of his illustrations of the Diseases of Corn, has since been published by him in the "Penny Magazine" for 1833. His figures of a somewhat analogous subject, the Apple-blight, and the insect producing it, accompany Sir Joseph Banks's Memoir on the Introduction of that Disease into England, in the 2nd volume of the "Transactions of the Horticultural Society."

Before the close of the last century, Mr. Bauer commenced a series of drawings of *Orchideæ*, and of the details of their remarkable structure, to which he continued to add, as opportunities offered, nearly to the termination of his life. A selection from these, which form one of the most beautiful and extensive series of his botanical drawings, was lithographed and published by Professor Lindley between the

years 1830 and 1838, under the title of "Illustrations of Orchidaceous Plants."

His other published botanical works are: 1. The first part, published in 1818, of "Strelitzia Depicta," a work intended to comprise figures of all the known species of that magnificent genus; 2. "Microscopical Observations on the Red Snow" brought from the Arctic Regions by Captain Ross, the globules contained in which, by some regarded as an *Alga*, he described in the 7th volume of the "Quarterly Journal" of the Royal Institution, as a species of *Uredo;* 3. "Some Experiments on the *Fungi* which constitute the colouring matter of the Red Snow," published in the "Philosophical Transactions" for 1820; and, 4. The Plates to the Botanical Appendix to Captain Parry's first Voyage of Discovery, published in 1821. One of the last productions of his pencil, illustrating the structure of a plant growing at Kew, which produces perfect seeds without any apparent action of pollen, will appear in the forthcoming part of the Linnæan Transactions.

In the year 1816, he commenced lending the assistance of his pencil to the late Sir Everard Home, in the various anatomical and physiological investigations in which that distinguished anatomist was engaged; and in the course of ten or twelve years furnished, in illustration of his numerous papers in the "Philosophical Transactions," upwards of 120 plates, which were afterwards reprinted with Sir Everard's "Lectures on Comparative Anatomy." These plates, which form together the most extensive series of his published works, embraced a great variety of important subjects, chiefly in microscopic anatomy, and afford abundant evidence of his powers of observation and skill in depicting the most difficult objects.

It is this rare, and previously almost unexampled union of the observer and the artist, that has placed Mr. Bauer foremost in the first rank of scientific draughtsmen. His paintings, as the more finished of his productions may well be termed, are no less perfect as models of artistic skill and effect, than as representations of natural objects. Of all his predecessors, Ehret alone approaches him in these particulars; among his contemporaries, none but his brother Ferdinand can be regarded as his equal.

Mr. Bauer became a Fellow of the Linnæan Society in 1804, and of the Royal Society in 1820. He died at his residence on Kew-Green on the 11th of December last, in the 83rd year of his age; and was buried in the churchyard of that parish on the 16th of the same month.

## Extracts and Abstracts from Foreign Journals.

[*From Müller's Archives.*]

*On the Microscopic Constituents of Milk.*—Professor Nasse, of Marburg, after a careful microscopic examination of milk from pregnant and suckling women, as well as from a cow and a bitch, and a comparison of his results with those of Donné and other preceding observers, says, that the following may be enumerated as the microscopic constituents of the normal secretion of the mammary gland:—1. The smooth, homogeneous, transparent oil-globules, to which, in addition to the common milk-globules, belong also the fine, scarcely-measurable particles and the larger drops of oil which swim on the top of the milk; 2. The cream-globules, which are distinguished from the oil-globules by their opacity, and their facette-like aspect; 3. The granulated yellow corpuscles; 4. The lamella of epithelium; 5. The more or less turbid medium, in which the four preceding kinds of corpuscles are suspended.

The first, the common milk-globules, are composed entirely of fatty matter, which dissolves completely and rapidly in ether. No membrane can be seen investing them. In the first nine days after delivery, the largest globules measure $\frac{1}{200}$ of a line in diameter; afterwards they are as much as $\frac{1}{100}$, but many are found of a much smaller size, and through all periods of lactation, the microscope, as well as other means of examination, show that the proportion of oil-globules in the milk varies greatly in different persons and under different circumstances.

In woman's milk perfectly fresh and warm, no other globules than these are sometimes found; but as soon as the milk has stood for some time exposed to the air, other corpuscles are discernible in it, which are distinguished from the preceding by a greater definiteness, a less degree of polish, and an appeance of facettes. In size they are nearly similar to the oil-globules, but if the milk be examined some time after it is drawn, a number are found much larger; $\frac{1}{50}$ of a line, or even more, in diameter. They are not so easily soluble in ether as the common milk-globules; they do not break up in drying, but they become clearer; acetic acid and ammonia have no influence upon them; they diminish for a time when the milk is boiled, but they re-appear gradually as it cools again; when left at rest they collect on the surface and form the cream; they easily stick together, and butter is formed when they are collected in one homogeneous mass. It is evident that they acquire their peculiar characters after they are drawn from the gland-ducts; for the author, as he watched them on the field of the microscope, could see individual globules which were originally clear, becoming on a sudden quite dark, and assuming the several characters of the cream-globules.

The yellow granulated corpuscles are almost peculiar to the colostrum; after the first few days from delivery, they cease to occur in the milk, and they disappear from it earlier in those who have borne chil-

dren than in primiparæ. They are not all spherical, the majority are flat. Their diameter is at most from $\frac{1}{200}$ to $\frac{1}{100}$ of a line; some are found measuring $\frac{1}{50}$ in length, and $\frac{1}{75}$ in breadth. They consist of small clear globules of fatty matter, which are connected together by a firm cement, which is unalterable by either ammonia or concentrated acetic acid, or by boiling. When the milk is left at rest, these globules collect on its surface; and when they exist in considerable numbers, render it unfit for making butter. The author believes that they are not, like the preceding globules, formed by the action of the air, but that they are produced by the secreting surface of the gland-ducts, and are analogous to the mucous-cells which are cast off from the surfaces of many mucous membranes, and to which they are in many respects similar.—*Heft III. p.* 258, 1840, *Transt. in Brit. & For. Med. Rev.* 1841.

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[*From Guerin's Revue Zoologique.*]

*Dujardin on Sponge.*—If a small portion of a living sponge be placed between two pieces of glass under the microscope, the living substance is observed grouped in irregular roundish masses, enclosing green or variously-coloured granules, according to the species under examination. These irregular masses appear at first sight motionless; but by carefully adjusting the light (éclairage), on the margin of these roundish diaphanous bodies a change in form is apparent at every moment; these isolated portions not unfrequently, by the tearing of the mass into pieces of from $\frac{1}{100}$ to $\frac{1}{200}$ of a millimetre, move slowly in the liquid, and fix themselves on the glass by means of their mobile and diaphanous expansions, like the true *Amibes*. These isolated portions might be considered as simple green globules filled with granules, if care be not taken to view, by the aid of refraction, the borders of their expansions. Such are the facts observed by Dujardin in *Spongia panicea* and in *Clione celata* on the coast of Manche, and in the Spongilla from the Orne and environs of Paris, since the year 1835.—1838, *p.* 67.

*M. Poiseiulle* is of opinion, that in those tegumentary parts of the body of man constantly and habitually uncovered, such as the face, neck, hands, &c., and which are consequently subjected to a medium temperature, the capillary vessels are of a much larger size than those situated in the other parts of the skin, which conclusion he arrives at from the circumstance of the capillary vessels circulating blood increasing in volume when the temperature is lowered to the medium in which they are placed.

*M. Philippe Pacini* of Pistoie, read a memoir at the Scientific Congress of Pisa, on a new organ discovered by him in the human subject. It consists of ovoid corpuscles, or small white opalescent globules, about two millimetres in size, which exist in considerable number in the subcutaneous cellular tissue of the palms of the hands and soles of the feet in man.

*Humboldt's Natural Wadding or Flannel.*—This substance has been found in great quantity on the surface of the earth, in Silesia, after an inundation of the Oder; it is composed of a filamentous tissue of *Conferva rivularis*, and fifteen different species of Infusoria, with silicious Carapaces.

*Beauperthuy* and *Adet de Roseville* addressed some observations at the sitting of the Academy of Science, Paris (19th March 1838), tending to prove that putrid decomposition is preceded by the development of microscopic animalcules; these are first of the genus *Monas*, and ultimately become *Vibriones*, which multiply with considerable rapidity.

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[*From the Annales des Sciences Naturelles, Jan.* 1840.]

*M. P. Gervais on several Species of the Order Acaridæ.* — In this paper two new species, (with figures), are added to the genus *Scirus*, viz. *S. obisium*, which is very small, not exceeding one-third of a millimetre in length, devoid of eyes, bright orange colour, and nearly transparent, &c. The other, *S. hexopthalamus*, having six eyes of a carmine colour; larger than the preceding; of an uniform orange colour. They were both found near Paris.

A species of the genus *Dermanyssus*, named from being met with on *Pipistrella, D. Pipistrellæ*, is also figured. Its length is about one millimetre, and is much smaller than the genus Caris. He has also figured, for comparison, *Psoroptes equi, Sarcoptes hominis*, and *S. dromedarii;* the latter was obtained from the scaly crust of a dromedary recently sent from Africa to the Jardin-du-Roi. No resemblance is to be perceived between that of the camel and the horse; whilst the first, on the contrary, so closely resembles that of man, that it may be mistaken for it if not examined with care; and it may be supposed, that it is to this similarity of structure that it passes from the animal to which it is peculiar, and lodges itself, with the greatest ease, conveying the disease from the one to the other. On careful examination, however, under high powers, M. Gervais considers that sufficient characters may be found to entitle it to the place of a species. In this paper the differential characters are given in detail; it is accompanied with a beautiful plate, on which seven species of the order are delineated.

*Duvernoy on some points in the structure of Limulus, with a more particular description of their branchiæ.*—This memoir, which is of some length, enters into the historical, descriptive, and theoretical parts of the subject.

*Lallemand's* paper on the origin and mode of development of Zoosperms, is inserted entire, for an abstract of which see p. 59 of this Journal. In some remarks which precede the paper, he states, that a single drop of fluid is sufficient for a perfect observation, a larger quantity being inconvenient. It is requisite to press the small piece of thin glass which covers it, to stop the currents of air there established, and to cause the bubbles of air to disappear which are there found imprisoned. Although the two glasses appear to touch, the Zoosperms move in the intervals with great freedom, as long as they have the power, and the evaporation has not proceeded to a too great extent; should this take place, a drop of water added, for some time prolongs their movements.

*June 24th*, 1841.—*Professor Owen, F.R.S., &c. President, in the Chair.*

After the usual business had been completed, the Chairman stated, that the Council had given orders for three of the most perfect microscopes that can be constructed. They had therefore requested Messrs. Hugh Powell, Andrew Ross, and James Smith, each to furnish a standard instrument, made according to their own peculiar views. The meeting was also informed, that owing to professional duties, Dr. Arthur Farre had that evening resigned the office of Secretary, which he had so well filled since the establishment of the Society. A vote of thanks was proposed to Dr. A. Farre by Mr. George Jackson, for his assiduity and attention to the affairs of the Institution, which was seconded by Mr. Edwards, and carried unanimously.

The Secretary read an abstract of Dr. Haro's paper, read at the last meeting (see p. 79), which was again brought before the Society with a view to discussion.

Mr. E. J. Quekett made some remarks, and exhibited specimens of water obtained from the London Docks, which attracted his attention on account of its blood-red colour; which Mr. Q. finds, on examination, to be owing to the presence of a multitude of small Entomostracous animals, of the genus Monoculos; in the interior of the individuals of which a bright red spot was observed. They occur in vast numbers, at certain seasons only, such as in warm and very tranquil weather, and usually form about one-sixth of the bulk of the water. The common people call it *spawn*.

Mr. Cornelius Varley stated, that he had brought for exhibition specimens of *Nitella* in fructification (both the globule and the seed.) They were not quite ripe, but when they arrive at that state, he expects to meet with the same moving particles which he some years since pointed out in *Chara*.

The meeting then resolved into the usual conversazione and examination of objects.

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## Microscopical Memoranda.

*Red and Green Snow*.—In the 44th No. of Taylor's "Annals and Magazine of Natural History," is the translation of a paper from Wiegmann's Archiv. (Heft. I. 1840), entitled, "On Red and Green Snow, by the late Prof. Meyen;" from which we learn, that M. Ch. Martius, who twice accompanied the French expedition to Spitzbergen, is of opinion, that the colouring matter of red snow, *Protococcus nivalis*, and of green snow, *P. viridis*, "are one and the same plant, only in different stages of development."—Prof. Meyen, however, considers it to be still a question, whether the colours of the snow are really produced by different states of the same species; but he has no doubt but that the so-called Protococci belong, not to the vegetable, but to the animal

kingdom, being true Infusoria; that P. viridis is identical with Ehrenberg's *Euglenia viridis*, and P. nivalis with his *Euglenia sanguinea*, (the *Enchelides sanguinea* and *Pulvisculus* of authors); that these Enchelides "exhibit at times a perfectly motionless state, in which they appear spherical;" and that in this state they have been described as Protococci; that, "it is these spherical, reposing animalcules, which often appear in incredible numbers, and, surrounded with a kind of slime, form more or less thick skins, which frequently cover the bottoms of shallow standing waters;" and it is in consequence of observing that these animalcules, after long remaining in this passive and inert state, occasionally resume their activity, that so many philosophers have spoken of a metamorphosis of Infusoria into plants, and *vicè versâ*.—*Newman's Phytologist, July*, 1841.

*Oberhauser's New Microscope.*—Through the kindness of Dr. Andrew Ure, we were favoured with a sight of the newly constructed Microscope, invented by M. Oberhauser, optician of Paris, during his recent visit to London. We do not pretend to give any description of the peculiarities of its construction. It enables, however, the observer to see an object the size of a half-crown piece at one time, and possesses the advantage of not reversing it. The facilities which it affords to the dissector from the above improvement are equally important. On inquiry, we were informed, that the price is as near as possible £10, and facilities will shortly be afforded of purchasing them in this country. It is much to be desired that some optician, resident in the metropolis, would import the various simple improvements in Microscopes which are continually being made in Germany and France, as many of them are exceedingly good, and of a price more within the latitude of the humbler scientific inquirer. Whoever should undertake this, we promise him every support.—*Editor.*

*Mode of obtaining the Wheel Animalcule, (Vorticella rotatoria.)*—In all the old books, and in many modern works, directions are given to seek for this interesting animalcule in leaden gutters, when wanted for the microscope; but I never could find them in such situations, and have not been without them, in one half-pint mug, for the last seven years. My method of raising and preserving this species is the following:—Early in the spring I fill a three gallon jug with pure rain-water, (not butt-water, because it contains the larvæ of the gnat tribe.) This quantity more than suffices to fill a half-pint mug, and to keep it at the same level during the season. I then tie up a small portion of hay, about the size of the smallest joint of the little finger, trimming it so that it may not occupy too much room in the mug, and place it in the water; or about the same quantity of green sage leaves, also tied and trimmed. About every ten days I remove the decayed portion (with a piece of wire) and substitute a fresh supply. A much greater number of wheel animalcules are raised by the sage leaves; but I have sometimes been obliged to discontinue the use of it, on account of its producing mouldiness. I take them out with an ear-picker, scraping up the sides of the mug near the surface, (including the dirt which adheres to them, by the tail), or under the hay and sage.—*J. Ford. Chelsea College, June* 25, 1841.

## XXV.—ON THE SILICIOUS BODIES OF THE CHALK, GREENSANDS, AND OOLITES.

*By J. S. Bowerbank, Esq., F.G.S.*

[Continued from page 103.]

THE perpendicular and oblique veins of flint, found in the chalk cliffs between Brighton and Rottingdean, and described by Dr. Mantell, present precisely the same internal characters as the tabular flint and the common tuberous nodules. The external characters are also similar to those of the tabular flint. If we observe these veins *in situ*, we shall frequently perceive, that the whole of their substance is not of uniform density, but that there are often, near the middle of the vein, parts where the two interior surfaces have not united, and that the spaces are generally filled with chalk. If this chalk be carefully removed or dissolved by diluted muriatic acid, the internal surfaces present the same appearances which have been described as characterizing the exterior of the ordinary flint nodule; and the aspect of the whole is precisely such as we should expect to find, if the two sides of a fissure in a rock were covered by our common fresh-water sponge, or one of similar habits; and the two outer surfaces had been built towards each other, and had joined in some parts, while in others they had approached, but had not united. The sides of these flint veins are not studded with numerous species of *Foraminiferæ*, like the under surface of the tabular flint, but from the position in which the flint veins have been built, it is a natural consequence that this should not be the case.

Having thus satisfied myself that the common tuberous flints, the horizontal tabular flints, and those forming perpendicular or oblique veins, were all produced by the same agency; and having observed the frequent occurrence of the partial imbedment of shells and other extraneous bodies, I was naturally led to infer, that in all probability the interior casts of *Echinites* and similar bodies, which are frequently found to be filled with flint, were also produced by the same agency; I therefore procured numerous specimens of silicified Echinodermata, and their examination strongly corroborated this supposition. Some of them were not entirely filled with flint; in one case a small portion only was silicious, in others two-thirds or three-fourths of their interior were so occupied, while the remaining space was filled with chalk. Upon clearing away the chalk from this part of the specimen, the flint never

presented an even surface, such as would have been produced had a portion of fluid matter entered though the ambulacra and subsided, as water or any similar liquid would have done; but, on the contrary, the surface was always undulated, and frequently projected considerably above the surrounding parts, more especially near the side of the shell, against which it was frequently built in semi-cones or columns, and in the space thus unoccupied by the flint there was always included one or both of the large orifices of the shell. The undulated surface of the flint thus concealed within the Echinite, presents exactly the same organic characters which are observed on the flint nodules. Most frequently the Echinite is filled with the flint; and the animal having thus built its prison full, has usually perished from want of sustenance; at other times it has survived this incarceration, and has grown out of one or both of the great orifices of the shell, and has then, in some cases, increased to a very considerable extent. On the exposed surface of the whole of these, whether it be only to the extent of a slight convex projection from the orifice of the Echinite, or to a considerable mass, an accordance will be found with the organic characters before described.

If some of the specimens of *Galerites* and *Spatangus*, which are filled with flint, be placed in diluted muriatic acid, and the whole of the shell be removed, the appearance presented by the silicious casts will still further corroborate the opinion of their spongeous origin. Occasionally it will be found, that the ambulacral orifices of the shell have been filled with fine threads of silex, and that these are based upon the cast; but more frequently we shall find, that opposite to each of these numerous minute orifices, there is a small but deep depression, the interior of which presents the usual characteristic surface observed on all flints, and the minute tubuli will be seen as boldly projecting at the bottom and round these small excavations, as upon any of the exposed surfaces of the flint. In these cases the ambulacral orifices of the shell have evidently been used by the sponge as so many inlets to admit the streams of water which were necessary to its existence; and the depressions thus produced directly beneath them, were clearly intended as a means of facilitating this operation. On the surface of the cast, in the immediate neighbourhood of the two large orifices of the shell, there is frequently a series of channels, which have evidently been left by the sponge for the same purpose as the depressions opposite the ambulacral pores, and the bottoms and sides of these channels exhibit the sponge tubuli in a like manner.

It frequently occurs in the *Echinites* which are filled with flint, that portions of the shell have been replaced or infiltrated with silex. In all these cases that I have seen, the silex presents a stalactitical or chalcedonic form, and never exhibits the spongeous texture. Very frequently, however, thin laminæ of spongeous texture are found to have been built between the plates of the Echinite, where they have happened not to have been quite in contact; and in these laminæ the tubuli are as beautifully distinct as in the most favourable portions of the mass of the cast. If the surface of the cast be microscopically examined, we shall frequently observe that the flint has not been in such a state of contact with the shell as a cast from a fluid material would be supposed to present; for although the boundary of each plate is well marked, the areas of their impressions exhibit such a view of the tubuli of the sponge as we might naturally expect to find where numerous minute tubes have been built against a flat or slightly concave surface. Sometimes the sponge has grown round the interior of the shell, and has left a hollow near its centre; and occasionally the sponge appears closely approximating, yet not quite adhering, to the inner surface of the Echinite. In these cases, a thin film of chalcedony is frequently spread over the organized surface of the sponge, which, in a specimen in my possession, is in several places to be seen through small breaks in the film.

*(To be continued.)*

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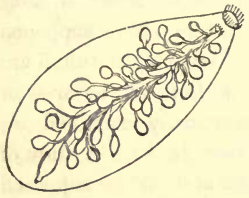
## XXVI.—AN ABSTRACT OF THE "INFUSIONSTHIERCHEN" OF EHRENBERG.—No. 2.

*By W. Hughes Willshire, M.D., M.B.S., Physician to the Fore Street Dispensary, &c.*

THE Infusoria are divided by Ehrenberg into two great classes, *Polygastrica* and *Rotatoria*. The *Polygastrica* are characterised by having their intestinal canal provided with numerous digestive sacs, or stomachs, and by their non-possession of a true rotatory apparatus. The *Rotatoria* are distinguished by their intestinal canal being simple, and by their possession of peculiar ciliated organs, by means of which they perform certain rotatory movements. The following are the characters of the Class *Polygastrica*, to which is added a Synoptical Table of the Families.

## Class I.—POLYGASTRICA.

Invertebral animals having no pulsating vessels; the intestinal canal provided with numerous globular digestive sacs, or stomachs; motion performed by pediform processes (very often vibrating), no true articulated feet being present; hermaphroditic. Form of body indefinite, from its property of increasing by gemmæ and spontaneous self-division.



**Intestinal Canal not definable, nor distinct from the digestive sacs, or stomachs.—*Anentera.***

- **Body devoid of appendages (no pediform processes) *Gymnica.***
  - Form of body constant
    - Self-division perfect or complete
      - Illoricated — MONADINA.
      - Loricated. — CRYPTOMONADINA
    - Self-division imperfect or incomplete (hence clustering)
      - ..... — VOLVOCINA.
      - ..... — VIBRIONIA.
      - ..... — CLOSTERINA.
  - Form of body varying.
    - Illoricated ..... ..... — ASTASIÆA.
    - Loricated ..... — DINOBRYINA.
- **Pediform Processes, varying. *Pseudopoda.***
  - Illoricated..... ..... — AMŒBÆA.
  - Loricated
    - A compound pediform process from one aperture — ARCELLINA.
    - A simple pediform process from one or each aperture — BACILLARIA.
- **Hairy. *Epitricha.***
  - Illoricated..... — CYCLIDINA.
  - Loricated ..... — PERIDINÆA.

**Intestinal canal distinct and definable. *Enterodela.***

- **Having but one orifice both for the reception and discharge of nutritious matter.—*Anopisthia.***
  - Illoricated ... — VORTICELLIA.
  - Loricated ... — OPHRYDNINA.
- **Having an anal and an oral orifice, one at each extremity.—*Enantiotreta.***
  - Illoricated ..... — ENCHELIA.
  - Loricated ..... — COLEPINA.
- **Orifices not terminal (oblique or varying) *Allotreta.***
  - Illoricated
    - Mouth furnished with a prooscis; tail not present — TRACHELINA.
    - Mouth anterior, tail present ... — OPHRYOCERCINA.
  - Loricated ..... — ASPIDISCINA.
- **Orifices ventral. *Catotreta.***
  - Illoricated
    - Locomotive organs—Cilii ..... — COLPODEA.
    - Locomotive organs—various..... — OXYTRICHINA.
  - Loricated ..... — EUPLOTA.

## Family I.—Monadina.

Polygastric animalcules having no distinct intestinal canal, lorica, or appendages; body uniform and constant in shape, dividing by spontaneous self-division not only into two portions, but by cross division into four or more.

All self-moving little bodies discoverable in water by the aid of the microscope, destitute of feet, hairs, bristles, or other external appendages; possessing no special gelatinous, membranous, or hard covering, like a lorica, but provided with internal digestive sacs, or stomachs, without a distinct intestinal canal uniting them together; not clustering in a chain, but sometimes appearing as if double, from the constriction of self-division, or from decussating constrictions, as if composed of four portions, or even-looking, like a mulberry; and whose globose, oval, or elongated bodies, during rest or motion, show no voluntary change of form: belong to the family Monadina. The following is a Synoptical Table of the *Genera*.

Tail not present.

- Lip not present
  - Swimming
    - Eye not present
      - Solitary ..... Monas.
      - Aggregated
        - voluntarily ..... Uvella.
        - through self-division Polytoma.
    - Eye present
      - Solitary
        - Proboscis one or two Microglena.
        - Probiscides many..... Phacelomonas.
      - Aggregated..... Glenomorum.
  - Rolling..... Doxococcus.
- Lip present ..... Chilomonas.

Tail present ..... Bodo.

## XXVII.—ON THE STRUCTURE AND USES OF THE STOMATA.*

*By Thomas Williams, M.B., M.R.C.S., Lecturer on Forensic Medicine, &c.*

THE ultimate organization and functions of the Stomata of Plants have long formed the subject of hypothesis and dispute among high authorities in vegetable physiology.

The best informed of the earlier observers regarded them as follicular pouches of the epidermis, through which the aqueous portions of the elaborated sap were exhaled. In his more recent work, it is stated by De Candolle, that they constitute the spaces where the spiral vessels end, and through which the latter obtain their supply of air; and hence has probably originated the title of "breathing holes," under which they are popularly known. By many modern botanists, they are described as definitely organized openings leading into cavities which freely communicate with the spaces between the cells of the parenchyma. There are not wanting others, by whom the *patulous* state of the stomata has been denied, who consider them to be closed by a membrane, described as a continuation of the epidermis, and which from its delicacy and transparency is invisible under ordinary circumstances. The mode adopted by the Rev. Mr. Reade to render evident this pellicle under the microscope, consists in charring the leaf to be examined, between two pieces of glass. Anxious to determine practically the relative merits of these conflicting observations, I submitted the leaves and green parts of several plants to this charring process; and unquestionably succeeded in rendering appreciable, in many instances, the existence of a pellicle over the stomata. But in order to be certain that this membrane was not the result of heat employed in preparing the leaf, of which I had some suspicion, I contrived a modification of the process suggested by the Rev. Mr. Reade. After having determined, by repeated observation, that *some* of the stomata in the spatha of the garden rhubarb *appeared open*, it was immersed in warm water, after which air was gradually forced into the parenchymatous interspaces, under the receiver of an air-pump,—the success of the injection being indicated by the extrication of minute bubbles of air from the inferior surface of the leaf. The escape of the air was evidently made through the stomatal orifices

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* Read at the Microscopical Society of London, August 18, 1841, and communicated to that Society by the Editor.

—this, at least, is the probable inference—and if admitted, a proof is afforded of the *open* condition of the stomata. The *injected* leaf was then carbonized between plates of glass, and again examined with reference to the condition of the stomata. Surprise was excited when, notwithstanding the proof of the patency, as presented by the escape of the infused air, a pellicle over the stomata, darkened by the charring as in the uninjected leaf, was observed under the microscope. This similarity of result, obtained by processes of experiment essentially different, establishes the correctness of my former suspicion, that the membrane is generated in the preparation of the leaf. Nor is this circumstance difficult of explanation, since in all plants a gummy substance, called by the Germans *Phycomater* or organic mucus, covers the surface and even the cells of the stomata and parenchyma; constituting, according to the more recent observations of Schwann, the materials out of which cells are originally formed. In reference to the stomatal pellicle, therefore, in the lamina of a fully developed leaf, the explanation is most probable which supposes that the air which, always in minute quantities, occupies the intercellular spaces, dilating under the heat of charring, acquires force enough to carry before it a bubble of this mucous substance, the summit of which becomes carbonised when brought into contact with the heated glass. By adhering to the margins of the aperture, it thus presents the appearance of continuity with the surrounding epidermis. In the examination of stomata generally, however, it should be remembered, that in some species of plants this mucous covering assumes the form of a universal cuticle, and by its induration over the stomata forms a distinct unorganised membrane.

After having multiplied to a few additional instances the observations, of which the results are just stated, it became evident that the stomatal organs, even in a limited portion of cuticle, exhibited different characters. By carefully detaching the epidermis from the stem of the *Tradescantia*, the stomata could be distinguished in a perforate condition, without any variation either in the figure or diameter of the orifices. In making, however, a comparative examination of portions of cuticle stripped from the inferior surface of a maturely formed leaf at the base, and from a small expanding bud at the summit of the stalk, differences in the form of the stomatal organs were again recognised. It was not until my examinations had been extended to several other plants, that I associated these varieties with differences in the *age* of the leaf from which the cuticle was taken for inspection. On the young and old leaves of the *Anchusa angustifolia*, and still more strikingly (if the

cuticle, which is dense, be shaved off with a sharp, thin scalpel) on the buds and expanded leaves of the *Ficus elastica*, when contrastively examined, the following distinctive features can be readily determined. Previously charred, the cuticle from the younger leaves will present stomata, which consist of two or more elliptically disposed vesicles, enclosing apparently a membrane, darkened by the charring, which can be distinctly observed to be bisected by a diaphanous line longitudinally traversing the oval space of the stoma. These appearances can likewise be distinguished in the *un*charred cuticle, with the difference, however, that the membrane here appears more like flattened cells, studded in their interior with granules of chlorophylle, which impart to the oval *space* a shaded or dark character; and this latter circumstance explains away the error of the idea which some microscopists have entertained, that the dark appearance is caused by the presence of air in the cavity beneath. In the epidermis of the older leaves, on the contrary, charred or uncharred, unequivocal perforations can be discovered bounded by *transparent* vesicles. Between these two extremes of the fœtal and adult formations, numerous intermediate conditions are presented. The *transparent* line, which I have satisfied myself to be a fissural aperture between the two apposed, darkened vesicles, with advancing development, acquires greater breadth, until ultimately it assumes the character of an *oval orifice*. By comparing the stomates on the bases and apices of the leaves of the *Hyacinthus orientalis*, the distinctions here indicated may be conclusively determined. Subsequently to the settlements of these points, my attention was directed to the observations of M. Hugo Mohl* on the development of these organs, in which allusion is made to the views of M. Mirbel.† While no positive statement is made in regard to the persistent condition of the stomata, it may be obviously seen that the account which is here presented, derives confirmation from their labours. These observers conducted their examinations upon the leaves of the *Marchantia polymorpha*, stalks of *Gourds*, and on the cuticle covering the articulations of *Tygnema*. Although their opinions are somewhat different, they agree upon the principle, that the orifices of these organs result from the graduated separation of the vesicles, which are nothing more than ordinary epidermoid cells, modified into a specific form. These facts, then, obviously point to the *general inference*, that the *normal* condition of the stomata is that of complete perforation, and that when the ap-

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* Annales des Sciences Naturelles, 1840, p. 222.

† Comptes Rendus, Tom. iii., p. 568.

pearance of an overlying membrane, *without* a central chink, is remarked, its adventitious formation may be inferred.

Whatever may be the difficulty of circumscribing into a definite function, the process of respiration in vegetables, physiologists can no longer doubt the tendency of facts in relation to the use of the stomata. It suggested itself to me, that if some expedient were contrived to suspend the functions of the stomata, a sort of negative or pathological evidence might be obtained in regard to their uses. The most effectual means, after some trials, were found in common varnish. If the *superior* surface of an aquatic leaf, to which it is known the stomata are confined, be well coated with varnish, after the lapse of a few days a distended, unhealthy, and ætiolated state will supervene. Under the conditions of this experiment, it is evident that two important consequences follow:—That, firstly, the process of exhalation is rendered impracticable by the impervious coating, inducing thus an undue retention of water in the Parenchymatous cells; and that, secondly, since the decomponent agency of the light continues, the liberated oxygen is equally retained, and, if the diseased appearance of the leaf be admitted as criterion, proves deleterious to its organism. Time and opportunity have not allowed me to correct and multiply these observations. So far as my acquaintance with botanical literature extends, I am not aware that this mode of experimenting upon the stomata has been anticipated. From various physiological considerations, the accuracy of the analogy cannot be doubted, which makes the stoma to the pneumatic or respiratory system of the plant, what the spiracle is to the tracheal apparatus of the insect. Although the former description of M. De Candolle, that the spiral-vessels communicated by open mouths with the stomatal cavities, has been denied by high authorities in modern phytology, from the experiments of Dutrochet, Dumas* and Dr. Boucherie, it is obvious that the spiral-vessels derive their supply of *atmospheric air* by means of the stomata. In the leaf of the Holly, which, upon maceration, separates into two layers, I have satisfied myself that the spiral-vessels accompany only the excurrent woody fibres, and are therefore confined to the upper lamina of the leaf. A parallel to this arrangement is found in the structure of some insects, in which the tracheal tubes follow *only* the centrifugal currents of blood. In the Holly, therefore, the communication with the stomata at the inferior surface, can only be indirectly through the intercellular passages.

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* Comptes Rendus de l'Academie des Sciences, 1840.

## Extracts and Abstracts from Foreign Journals.

[*From the Annales des Sciences Naturelles.*]

*C. Montagne on the Nucleus of Sphærophoron.*—The apothecium of this genus of Lichens is at first only an elliptical expansion of the extremity of a division of the plant. If, in this state, a longitudinal section be made, the cavity will be found to be occupied by the nucleus, which is of a diagonal form. This circumstance is owing to a hemispherical projection of the medullary or central layer of the thallus, representing a kind of torus, from all parts of which, tubes, bearing sporidia or thecæ, diverge. The upper part of the sporangium is already filled with this scobiform substance altogether different from the sporidia, the colour of which is of a beautiful blue or transparent indigo, but which appears very black when in a mass; the thecæ and sporidia are tinted of a like shade, but for the most part paler. By degrees the cavity enlarges, not only by the increase of the extremity of the branch, but still more by the insensible depression of the internal projection formed by the medullary layer of the thallus.

The nucleus contained in the apothecium differs but little from that of other Lichens. It is composed of straightened filaments, pressed one against the other, exactly as in the proligerous plate of a Lecidea, and united together by the intervention of a mucilaginous substance, a ready absorbent of water. These tubular filaments, closed at their free extremities, have absolutely the form of *asci* or utricules of a Peziza. They are linear, obtuse at the summit, and contracted into a short pedicel at their base, which appears to be the continuation of the filaments of the medullary layer. In their young state, they are perfectly transparent, and contain an opaline moisture (humeur) in which appear hereafter transparent globules. They are only to be seen by readjusting the focus of the microscope. In a short time these filaments, which can only be considered as true thecæ, take on a bluish tint, becoming more intense by age, preserve always the sky blue colour when viewed by transmitted light.

The sporidiæ become also more and more apparent in the thecæ: whether globular or oblong, they are arranged in a single row. At length, the theca is about to burst; they remain free, and mix with the mass of black dust, from which they are nevertheless distinct, and which is very difficult, at least for Dr. Montagne, to determine the origin, for it exists from the very first formation of the apothecium.

The theca is from five to six hundredths of a millimetre in length, by a two-hundredth in diameter. The sporidia, which are quite spherical, or rather longer than they are wide, acquire, when free, about the $\frac{1}{100}$th of a millimetre in diameter. The sporidia are surrounded by a transparent expansion (limbe) and are, like the thecæ, of a blue colour. —*March* 1841, *p.* 149.

*Agassiz on the Structure of the Scales of Fish.*—M. Mandl considers that I am mistaken in affirming, that *the scales are composed of super-*

*posed plates;* he asserts, on the contrary, that they are formed of *juxtaposed cellules.* He endeavours to show it in the scales of Locha; and yet, in the same fish, I have succeeded in separating the plates, as they grow one upon the other; and in numerous transverse sections of different scales, I have seen, with a power of 250 diameters, the superposition of these plates throughout the whole thickness of the scales; I have even published a figure of a similar section of the scale of *Salmo Trutta*, in my *Histoire Naturelle des poissons d'eau douce.*

Mandl further affirms, that the diverging traces on the surface of the scales, which I have described as *furrows*, are true *canals.* I can scarcely imagine that Mandl has mistaken the middle tubes of the scales of the lateral line (which ramify occasionally at their posterior extremity) with the furrows of their surface; this would be imputing to him too gross an error; nevertheless, I cannot see (entrevis) any other explanation to that which he advances; but that which I can positively affirm is, other scales never have canals in their surface, but furrows, compressed from above, which are prolonged to the margin of the superior layer of growth to the edge of the next inferior layer, as is evidently seen in all transverse sections that can be made in any scale offering similar traces.

Mandl is of opinion, that the toothings on the posterior border of pectinated scales are not *notches of the borders of the plates*, but *true teeth, having a root enveloped in a sac.* It is quite sufficient to examine the scales of Sciena, which Mandl cites as an example, in adjusting successively the scale by the focus of the microscope, to be convinced that all this apparent dental apparatus depends on optical illusions, resulting from the difference of thickness of these dentations at their base and at their point; and that in truth, the points which tooth the posterior border of the scales of fish, which I call *Ctenoidæ*, are simply the result of *notches*, more or less deep at the border, and not detached teeth.

Lastly, Mandl appears to be unacquainted with the existence of enamelled scales, which differ materially in their structure from those of ordinary fish, and are found in an order, of which the greater number of species are extinct, and to which I have given the name of Garoidæ. To these, and other remarks, M. Agassiz concludes, *from his new observations, that the description he has given on a former occasion is exact, and that the manner in which M. Mandl examined the same, is erroneous in every respect.*

To this Mandl replies in a succeeding Memoir, that:—1. The parts of the scales which I call *teeth*, are not, as M. Agassiz observes, the result of an optical illusion; I can show their existence to the Commission.—2. The *canals*, of which I have spoken assuming different forms, do not exist, according to M. Agassiz: the Commission may convince themselves that they really do exist.—3. I have nowhere stated the opinion attributed to me by M. Agassiz, that the scales are formed of *juxtaposed cellules;* I have, on the contrary, shown the presence of *two different lamellæ;* I speak, as may be seen in the analysis of my memoir inserted in the Comptes Rendus of the sitting of the 24th June, 1839, of *superposed lamellæ in an inferior fibrous layer*, and of *cellules*

*only in the lines* which are found on the surface of the superior layer of the scale. M. Agassiz has then fallen into a great error relative to the manner in which I examined the structure of the scales.—*January*, 1840, *p.* 58, 62.

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[*From the Comptes Rendus.*]

*Infusoria of Rock Salt.*—M. Marcel de Serres communicated a note on the subject of the observations which he is making along with M. Joly. In the specimens of rock salt of a tolerably decided greenish colour, brought from Cardona (Spain), the Infusoria appear more rare, of a smaller size, and less distinct than in the specimens of a red colour before examined.

This, says M. Marcel de Serres, finds an explanation in M. Joly's previous observations on the change of tint, which the Infusoria that colour our salt marshes undergo by age. These animalcules, which are white at their birth, become green in their middle age, and do not till their adult age take the purple tint which makes them so remarkable. In general, the green Infusoria are not so often seen as the red in salt marshes, which seems to indicate that these *monades* remain but a short time in their middle state.

We have found the same Infusoria in the Argilo-calcareous marls, which are found at Cardona beneath the rock salt. In this locality they have their beautiful purple tint, but they are in too small numbers to communicate it to the mass of marl, which is of a greyish hue. This fact also proves, that in the ancient world, as in the present, the animalcules were precipitated after death to the bottom of the waters in which they had previously lived.—*March* 16, 1840.

*Theory of Digestion, &c.*—The Royal Academy of Sciences and Belles Lettres at Brussels, offers a prize for the best essay on this subject; embracing, more particularly, a microscopic examination of the chyme, and to determine the relation which subsists between the parts composing the chyme and certain aliments; such as albumen, gelatine, milk, and its products, &c.

The prize offered by the Academy, is a gold medal of the value of 600 francs. It is requisite that the memoir be legibly written in Latin, French, or Flemish, and that it be forwarded, free of expense, before the 1st of February 1842, to M. Quetelet, Perpetual Secretary to the Academy.

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PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

*August* 18*th.*—*R. H. Solly, Esq., F.R.S. &c., in the Chair.*

A PAPER was read by Mr. John Quekett, ' On the Anatomy of four species of Entozoa of the genus Strongylus, from the *Delphinus Pho-*

*cœna*, or Common Porpoise.' The subjects of the present communication, with one exception, were found in the lungs of the porpoise. Two of them have been long known, and described by Rudolphi, Klein, and others, under the names of *Strongylus inflexus* and *S. minor*, whilst a third, from the circumstance of its being found in company with the *S. inflexus*, has, by many observers, and by Rudolphi particularly, been considered as a younger specimen of that species; and the fourth appears hitherto either to have escaped notice, or else to have been confounded with the last. The author's examinations of this Entozoon lead him to consider it as a distinct species, and from certain peculiarities he has named it *S. invaginatus*. The largest mentioned was *S. inflexus;* this species occurred most abundantly in the bronchial tubes, and in such numbers as almost to close them up, but many specimens were found in the right ventricle and auricle of the heart, and in the principal blood-vessels of the lungs as well. The average length of the male is about seven inches, whilst that of the female is nine inches. Our space will not allow us to enter into the minute anatomical details, which will doubtless be published elsewhere. The next species was found in common with the last, being twisted together in a knot around them, both in the bronchial tubes and blood-vessels; it has been noticed as the young of *S. inflexus*, but on comparison the author finds that the difference between the two is so marked, as to leave no doubt of their being distinct species. Kuhn has described it as *S. convolutus*. The third species is the smallest of the whole, and from this circumstance has been named *S. minor* (Quekett). It occurred in the venous sinusses of the heart, and in the cavity of the tympanum, and from living in blood they were of a reddish hue. The fourth species was found on the surface of the lung of a porpoise, the pleuritic investment of which was raised into little tubercles about the size of a small pea; and on cutting into one of them five very long and slender white worms were drawn out, one being much shorter than the rest, which was subsequently ascertained to be the male. On tearing a portion of the lung a vast number of these cysts were found imbedded in its substance, and in each one there were several worms coiled up in a very small compass; the cysts could be readily torn away quite entire from the surrounding tissue with the worms in them. After describing and detailing the structure of the male and female of each of the species above noticed, the author concluded the paper with alluding to some curious facts which present themselves for consideration. Entozoa, from the time of their first discovery to the present day, have exhibited more astonishing and wonderful phenomena than any other tribe of animated beings, and perhaps, throughout the whole kingdom of nature, no class has been so frequently the subject of opposite opinions, and on the matter of their generation we are now nearly as much in the dark as ever. In the various specimens mentioned above, there is, however, the startling truth of one and the same species of Entozoon living in such opposite media, viz., in blood and in air; for it has been above stated that *S. inflexus* was found in the bronchial tubes in the principal blood-vessels of the lung, even in the heart itself, in the venous sinusses at the base of the brain, and the cavity of the tympanum were literally

clogged with the *S. minor*. Now it cannot but be imagined that any animal so infested must, as a necessary consequence, have both the functions of respiration and circulation greatly impeded. Three porpoises examined by the author within the last three months have all had Entozoa, and these were all taken in the Thames; and the author considers it probable that this may be the reason of their leaving the ocean and running up the rivers at particular seasons of the year, and it would be curious to ascertain whether those taken at sea about the same period were so infested. The author considers also that some light may be thrown on the occurrence of Entozoa in particular parts of an animal, when they have been actually found living in the blood; and it may also be now readily imagined how the young, when emitted from the parent, can be transported to all parts of the body by means of the circulation, and analogy would lead to the conclusion that the blood of other animals may contain Entozoa as well as that of the porpoise. Another curious circumstance connected with these *Strongyli* is, that all the specimens of the four species are nearly uniform in their size; no young ones having been met with amongst them; these probably are yet to be found in other parts of the body, where the scrutinizing eye of the anatomist has as yet failed in detecting them. The paper was accompanied with drawings, showing the anatomical details described by Mr. J. Quekett.

A communication was then read from Dr. Thomas Williams, in which it was shown, that under natural circumstances the stomata are *openings unclosed* by membrane, as it was attempted to prove by the experiments of the Rev. Mr. Reade. This paper is inserted entire at page 118 of the present number.

Mr. Andrew Ross exhibited to the meeting his "Educational Microscope," an account of which was given at page 111 of our last number.

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## PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

*August 5th*, 1841.—*Sir Henry Marsh in the Chair.*

The minutes of the last meeting having been read, the Secretary informed the Society, that he had received a letter from Mr. Bergin, one of the members, in which he requested him to read before the present meeting, some notes relative to a curious animal, which had lately fallen under his notice for the first time. The notes were accompanied by four or five pen-and-ink etchings.

Mr. Bergin's communication was then read by Dr. Hill. In it he directed the attention of the Society to the beautiful though complicated organization of a small animal, which he believed to be a *hirudina*, though he was unable to give it a name, or to say to what species it belonged. He had found it in some water taken from a ditch in the Phœnix Park. One of the most striking peculiarities of this animal was the mode of its carrying its young; they were ten or twelve in number, and were attached by one extremity to the lower surface of the posterior third of the body of the parent animal; each pos-

sessed considerable extensile and retractile powers, and the whole presented much the appearance of a cluster of the tentaculæ of a polyp. The author described minutely the internal organization, mode of progression, and other peculiarities of the animal, and strongly recommended the members of the Society to make search for additional specimens, assuring them that they would be amply repaid by an inspection of this very curious and interesting creature.

Mr. Calwell exhibited a specimen of the animal described by Mr. Bergin, prepared in balsam: he stated, that he had more than once met with it, but was unacquainted with its name and history.

Dr. Hill mentioned, that a few days since, a specimen of the same animal had been given him, which was obtained from a pond in the county of Meath; and that, being unacquainted with it, he had forwarded it to Mr. Bergin, who happened to be engaged at the very time in inquiries relative to the same creature.

Dr. Hill then read a brief notice of some peculiar appearances exhibited at this season of the year by diseased wheat, when examined under the microscope.

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## Microscopical Memoranda.

*Micrometers.*—For the sake of those of our readers interested in the use of these instruments, we find in the *Bulletin de la Societé Imperiale des Naturalistes de Moscou, No.* 3, *Année* 1837, a paper by Professor Alexandre Fischer, "On the advantages of Micrometers in the Focus of the Eye Piece of Compound Microscopes, and on the mode of placing them;" but as our space does not allow us to enter into the details and formulæ, which occupy twenty-six pages, we must rest satisfied with referring only to the above quotation.

*On Microscopic Vegetable Skeletons found in Peat, near Gainsborough, by Mr. Binney, of Manchester.*—Mr. Bowman read a paper at the last meeting of the British Association on some skeletons of fossil vegetables, found by Mr. Binney, in the shape of a white impalpable powder, under a peat-bog near Gainsborough, occupying a stratum of four to six inches in thickness, and covering an area of several acres. It remained unchanged by sulphuric, hydrochloric, and nitric acids, and by heat, and was concluded to be pure silica, in a state of extremely minute subdivision. On submitting it to the highest power of the compound microscope, it was found to consist of a mass of transparent squares and parallelograms, of different relative proportions, whose edges were perfectly sharp and smooth, and the areas often traced with very delicate parallel lines. On comparing these with the forms of some existing *Confervæ* of the tribe *Diatomaceæ*, which are parasitical on other *Algæ* both marine and fresh water, but so minute as to be individually invisible to the naked eye, the resemblance was found to be so strong as to leave no doubt of their close alliance, if not perfect identity. Mr. Bowman considers them to be the counterparts of the

fossil Infusoria of Ehrenberg, and occupying the same place in the vegetable kingdom as those do in the animal.—*Ninth Report Brit. Assoc.* 1840.

*Are the Closteriæ Animals or Plants?* — Ehrenberg enumerates the following reasons for considering the *Closteriæ* as belonging to the animal kingdom. They enjoy voluntary motion, they have apertures at their extremities, they have projecting permanent organs near the apertures, which are constantly in motion, and they increase by horizontal spontaneous division. Dr. Meyen, who was of the opposite opinion, mentions, as the most important observations in favour of their vegetable nature, that their structure is exactly similar to that of the *Confervæ:* their formation of seed, and the development of this seed, is like that of the *Confervæ.* The occurrence, moreover, of amylum in the interior of the *Closteriæ,* with which they are frequently nearly filled, is a striking proof of their being plants; they have no feet. What Ehrenberg regards as such, are molecules, having a spontaneous motion, which occur in great number in *Clos. Trabecula,* and quite fill a canal the whole length of the plant. Their function is difficult to determine, but they also occur in very many *Confervæ,* and may perhaps be compared with the Spermatozoa of plants.—*Ann. Nat. Hist. Vol. IV, p.* 71.

*Griffiths on Ephedra.* — He is of opinion, that the ovulum is, as described by Mr. Brown, naked. The first species referred to had a very silicious stem, without stomata, unless certain discs blocked up with some hard matter (silex?) are to be so considered; this he believes to be the correct view, inasmuch as the other species, which has no silicious deposit, has stomata of the ordinary structure arranged in a similar manner.—*Proc. Linn. Soc.* 1841.

*Diameter of the Globules of Human Blood.*—For the sake of reference, we insert the measurements of the globules of the human blood, given by various observers: —

| | | |
|---|---|---|
| Hodgkin | $\frac{1}{3000}$ | of an inch. |
| Jurine | $\frac{1}{5240}$ | ..... |
| Jurine, in a 2nd measurement | $\frac{1}{1940}$ | ..... |
| Bauer | $\frac{1}{1700}$ | ..... |
| Wollaston | $\frac{1}{5000}$ | ..... |
| Young | $\frac{1}{6060}$ | ..... |
| Kater | $\frac{1}{4000}$ | ..... |
| Ditto | $\frac{1}{6000}$ | ..... |
| Prevost and Dumas | $\frac{1}{4076}$ | ..... |

The thickness of the particles, which is perhaps not so uniform as the diameter of the discs, is on an average to this latter dimension, as 1 to 45.—*Hodgkin and Lister's Micros. Observ. on the Blood, &c., Phil. Mag. Vol. II, p.* 133.

## XXXI.—OBSERVATIONS ON PARASITICAL GROWTHS ON LIVING ANIMALS.

*By George Busk, Esq., Surgeon to the Hospital Ship, Dreadnought, &c.*

The occurrence of parasitical growths, or of organized productions, having a close analogy with some forms of cryptogamic vegetation, upon the surfaces or within the substance of living animals, and in many instances constituting the cause of disease, is a subject of considerable importance in pathology; and although it would be out of place in these pages to enter into the pathological relations of these affections, yet as the microscope has been the means by which the few facts as yet ascertained in this matter have been brought to light, it may not, perhaps, be deemed irrelevant to the object of the Microscopic Journal, to admit a short statement of what has been observed, and thus to bring into one point of view, and attract the attention of microscopists, to a probably not unfertile field of investigation.

1. On the 28th of August, 1832, Mr. Owen read some notes before the Zoological Society on the anatomy of the Flamingo, *(Phœnicopterus ruber)*, in the lungs of which bird he found numerous tubercles and vomicæ, the inner surface of which latter was covered with a greenish vegetable *mould* or *mucor*. Mr. Owen presumed that the growths had taken place during the life of the animal, and thence concluded that internal parasites are not derived exclusively from the animal kingdom, but that there are *Entophyta* as well as *Entozoa*.*

2. In the year 1835 a disease to which silkworms are subject, known under the name of *Muscardine*, was first described by M. Bassi of Lodi, and M. Balsamo, a botanist of Milan. They ascertained that this disease was owing to the growth, on or within the body of the caterpillar, of a cryptogamic vegetation. M. Audouin, in 1836 and 1837, in a paper entitled "Anatomical and Physiological Researches on the contagious disease which attacks silk-worms, and which is designated under the name of *Muscardine*,"† described a series of experiments on the chrysalis of *Bombyx Mori* thus affected, and which he had received from M. Bassi. He was able to follow in detail the transformation of the

* Philosophical Magazine, 1833. New Series, Vol. II, Page 71.

† Annales des Sciences Naturelles, Vol. VIII, New Series, Page 229, Pl. 10, 11.

fatty tissue of the insect into radicles (thallus) of the cryptogamic vegetation, to which he gave the name of *Botrytis Bassiana*.* (Pl. 1. fig. 4.)

3. The next observation is that of M. Des Longchamps,† in a paper "On the habits of the Eider duck *(Anas mollissima)*", in which he describes the occurrence of layers of *mouldiness* developed during life, on the internal surface of the aerial cavities of one of these birds, which he examined on the 2nd July, 1840, while yet warm. This vegetation occurred in the form of flakes or layers, deposited in great numbers on the walls of these cavities. Most of these plates, or layers, were circular, and they varied in size from two or three millimetres to several centimetres. The small bronchial tubes were covered with them in great abundance. Two kinds of these plates or flakes were observed. Beneath the larger ones the membrane upon which they were situated was uniformly reddened and thickened; beneath the smaller ones, towards the centre, a vascular net work was seen, surrounded by a zone, in which the vascularity was less distinct, and beyond this zone the vascularity was again increased, but in less degree than in the centre. The colour of the smaller flakes was a dirty white; the larger ones were also white, but greenish in the centre. The border of the larger flakes was irregular, which irregularity evidently resulted from their being formed by the confluence of several adjoining smaller flakes. Examined under the microscope, this mouldiness appeared to be composed of transparent non-articulated filaments (Plate 1, fig. 3), slightly, if at all branched, and intermixed like the fibres of felt. These filaments, imbedded in a layer of albumen, were in parts scarcely the $\frac{1}{200}$th of a millimetre in diameter. M. D. further observed numerous ovoid or globular vesicles in the felt-like mass, of the same diameter as the filaments, which vesicles he looked upon as sporules. These growths appeared to have no immediate connexion with the living tissue.

4. A mouldiness of a different kind was also observed by MM. Rousseau and Serrurier‡, which they describe as being found not unfrequently in pigeons and fowls, particularly in cold and humid situations, or in rainy seasons. These observers found it in the body of a male

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* For further observations on this disease, vide a paper by M. Johanny, Annales des Sciences Naturelles, Vol. XI, Page 65, 80; and one by M. Crivelli, in Schlectendahl's Linnæa, 118, 123; and by M. Bonafous, L'Institut, No. CCLXXIX, Page 154; and Henle's Pathologisch. Untersuchung.

† Annales des Sciences Naturelles, June 1841, Page 371.

‡ Comptes Rendus, 1841.

parroquet, which died of a tubercular disease, in a sort of false membrane between the intestines and vertebral column, which membrane was covered with a greenish pulverulent mouldiness, so light, and so little adherent, that it could be blown off as a fine powder. They further state, that a similar affection has been noticed by them in animals of other classes, as in *Cervus Axis*, and *Testudo Indica*.

5. In 1839, M. Schœnlein* announced the fact of the existence of *Mycodermata* in the crusts of *Tinea favosa*. Priority, however, in this observation, is claimed by M. Remak,† who says that he made it as far back as 1836, when he stated that *Tinea favosa* consisted of fungoid filaments.‡

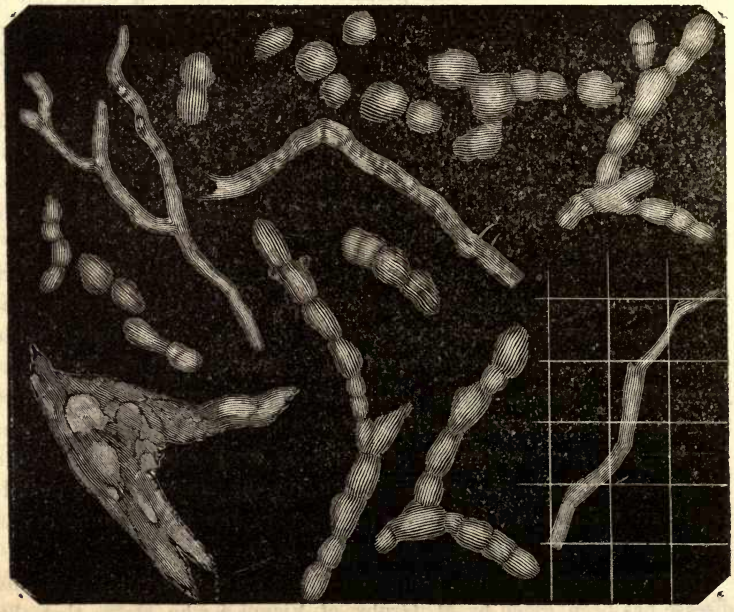
On the announcement of Schœnlein's experiments in 1839, they were repeated by MM. Fuchs and Langenbeck, at Göttingen, who supposed that they proved the existence of *mucores*, not only in the crusts of true Tinea *(Porrigo favosa* and *P. lupinosa)*, but also in the majority of eruptions belonging to what they term cutaneous scrofula, for instance, in the crusts of *Impetigo scrofulosa*, and in those of serpiginous ulcers. These researches are published by M. Fuchs, in his Compte Rendu the Polyclinique of Göttingen, in the *Ann. Hanov.* de M. Holscher, Cahier de 1840, and still later in the first volume of his *Traité des maladies de la peau*, Göttingen, 1840.

Latterly, however, a much fuller and more correct description of this disease has been given by M. Gruby, of Vienna,§ who states that the crusts of Tinea favosa contain, or in fact are made up of aggregated *Mycodermata*. This growth consists of numerous corpuscles, rounded or oblong, the longitudinal diameter of which is from about the $\frac{1}{300}$th to the $\frac{1}{100}$th of a millim, and the transverse from the $\frac{1}{300}$th to the $\frac{1}{150}$th. They are transparent, with a defined border, and smooth surface; colourless, or slightly yellow, and homogeneous. The corpuscles are either separate, or, by their apposition end to end, constitute beaded or articulated filaments, which are simply cylindrical or branched, according to the part of the crust in which they are found. Besides these beaded filaments, other much smaller branched filaments are to be observed, which are furnished at certain distances with partitions (cloisons vegetales), and thus represent oblong cells, in which are found very minute round, transparent molecules, as exhibited by the figures in the accompanying plate. Occasionally, some granules are found ad-

* Müller's Archives. † Medicinisch. Zeitung, No. XVI, Page 73, 74.

‡ Valentin's Repertorium, 1841. § Comptes Rendus, 1841.

herent to these filaments, similar to the spores of *Torula olivacea*, and *T. sacchari*.* The form of these filaments, is considered by M.



Portion of Epidermis. Scale $\frac{1}{8000}$ of an inch each.

Gruby a sufficient proof of their vegetable character, and according to M. Brogniart they belong to the group of *Mycodermata*.

Each crust of Tinea is described by M. Gruby to consist of two envelopes, formed by the cuticle, and an aggregation of Mycodermata, which are enclosed within them *like fruit in their pericarps*. The crusts are placed on the *surface* of the true skin, and the *Mycodermata* are developed among the cells of the epidermis.

The external disc of the capsule, which at the commencement is not perforated, becomes open in the centre by a small hole, whose borders are elevated, by the continual development of the Mycodermata. This opening enlarges by degrees, and there is thus formed in the centre a

* Icones fungorum hucusque cognitorum. A. C. J. Corda, Pragæ, 1837, 1840.

[The above figures, copied from the drawings of Mr. G. Busk, are engraved on copper, by Mr. J. Shury, Jun., of 13, Charterhouse Street. We were desirous of giving the process a trial, as it appeared to us peculiarly applicable to the illustration of such structural subjects. Here is the result; we leave our readers to form their own opinions as to its merits or demerits.—*Editor*.]

whitish excavation, whilst the borders remain of a yellowish colour. Simultaneously with the enlargement of the opening, the Mycodermata protrude, and are developed like a fungus, and finally the borders disappear; the stems of the Mycodermata are prolonged, and the sporules shoot out vigorously, more in the centre than at the periphery. From this mode of growth, the form of the crust becomes quite altered, it being, when completely developed, convex, instead of concave on the outer surface.

M. Gruby practised inoculation with the contents of these crusts upon thirty Phanerogamous plants (but succeeded only once); on twenty-four silk-worms; four birds; eight mammals; and six reptiles, without any result. Similar inoculation in the arm of himself four times, and of another individual once, was followed also by no result, except in one instance, when a little inflammation ensued. Consequently, out of seventy-seven inoculations, one successful result only was obtained, and that on a Phanerogamous plant; a strange fact, as is truly observed by M. Gruby.

At pages 24 and 139 of this Journal will be found notices of various other observations of parasitical growths on animal bodies; but these my limits will not allow me farther to detail. In the present number, (p. 155) also, is an account of similar vegetation on the ova of fishes, to which it proves highly destructive.

On the 1st of March 1841, Mr. Westwood exhibited at the Entomological Society, dried specimens of Chinese larvæ, from the back of the neck of each of which a slender Fungus, twice as large as the body of the insect, had been produced. The vegetation was stated to be analogous to some on larvæ from New Zealand, and is named *Clavaria Entomorhiza*.* M. Corda gives the figure of a Coleopterous insect† covered with *Penicillium Fieberi;* and a similar instance of the growth of a minute Conferva upon the body of a *Dytiscus marginalis*, occurred a short time since to my observation. This insect was kept in a glass vessel, in which were growing some plants of Valisneria spiralis, the leaves of which were much infested with the Conferva. The beetle was killed, apparently by the growth of the Conferva among the branched hairs, with which its spiracula are furnished internally.‡ (Pl. I. Fig. 1.)

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* Annals of Natural History for November 1841.

† Pentatoma prasina, Op. cit. Pl. xi.

‡ [We are informed by Mr. J. T. Cooper, that he has frequently removed from the gills of gold fish, kept in a cistern in his garden, a quantity of Confervæ, the rapid growth of which over the whole surface of their bodies, in every instance caused death.—*Editor.*]

These are the principal facts which I have been able to collect on this subject; for it is scarcely worth while to refer to the vague speculations of M. Meynier of Orleans, whose assertion of the analogy of warts and similar growths, with Fungi of the order Gymnospermia; of Lepra and Psoriasis with Lichens and Mosses; and of pulmonary tubercle with Lycoperdon, may, I think, justly be considered more the fruit of a heated imagination than of sure observation. The *Mucores* observed by Langenbeck in the body of a person dead of typhus, had certainly no connection with that disease; and, as for the opinion, that hospital gangrene is dependent on the presence of a fungoid growth, I am unable to refer to the authority, upon which such a doubtful statement is founded.

The above briefly recited facts are far too few in number, and not sufficiently precise, to allow of any general deductions of importance to be drawn from them; but it appears clear,

1.—That parasitical growths occur in nearly all classes of the animal kingdom.

2. That these growths arise usually on the surfaces of animal organs, and are sometimes prolonged thence into the textures of the part.

3. That they have in several instances been ascertained to constitute the cause of disease and death; and that the disease thus produced has been found in some cases to be contagious.

4. That they are probably of two kinds, the one peculiar to animal bodies, and the other consisting of these Cryptogamic vegetations, which readily sprout up under favourable circumstances, on almost any inanimate substance.

To the former kind may be referred the *Muscardine* of the silk-worm and *Mycoderm* of Tinea; and to the latter, most of the other growths above alluded to.*

The vegetable nature of these growths does not in all cases appear so clear as might be supposed. In some of the instances cited above, there can be no doubt on the matter; but in others, and especially that of the *Mycoderm*, constituting the crusts of Tinea, it is allowable to doubt whether the growth may not be more properly referred to the animal kingdom. In fact, it would appear, from the chemical consti-

* With the exception of the Parroquet, whose case is related by M. Rousseau and M. Serrurier, in which, in the account given by these observers, the seat of the parasitic growth is by no means clearly defined, it would appear that these parasitic growths have nearly all had some relation to the air passages, and in this point of view it is interesting to refer to the account of *Chrysomyza Abietis*, at p. 155 of this Journal.

tuents of these crusts, impossible to hesitate in ascribing their contents to that division of animated nature; for according to the analysis of Thenard, they contain

70 Albumen.
17 Gelatine.
5 Phosphate of lime.
8 Water and loss.

100

a composition certainly more animal than vegetable. With regard to this, also, it is interesting to refer to the paper of M. J. B. Desmazieres,* in which the genus *Mycoderma*, founded by Persoon in 1822, is for the first time accurately described and figured. He describes five species occurring in various vegetable infusions. The marked similarity of the figures of some of these species, with the Mycoderm of Tinea, is sufficiently curious, viz. those of *M. glutinis farinulæ* and *M. cerevisiæ*, or those occurring in flour-paste or sour beer (Pl. I, fig. 2). M. D., whose paper is well worthy of perusal, considers, from his having observed the globules of the Mycodermata occasionally in active motion, that they are of animal nature, and gives the following definition of the *genus*: —Mycoderma.—*Desmaz. Ann. Sc. Nat. Tom. X. 1e Ser. p.* 59.—"Animalcula monadina simplicissima, hyalina, gelatinosa, minutissima, prædita locomobilitate plusminusve manifestâ; inter se ab uno extremo ad alterius extremum ordine longo cohærentia, sive in statu primordiali, sive post elongationem plus minusve notabilem; efformantia hâc adjunctione fila inertia, hyalina, creberrima, ramosa, moniliformia, vel dissepimentis conspicua, fere semper incumbentia liquoribus, vel substantiis humidis in quibus nascuntur et ubi, per eorum implicationem, constituunt pelliculam plus minusve spissam. Generatio per gemmas interiores."

The resemblance in figure, however, of this parasite to various growths, in all probability vegetable, is equally striking, if we do not consider that all growths composed of distinct rounded cells, whether of animal or vegetable nature, will necessarily much resemble each other. For instances of this resemblance, it is only necessary to refer generally to the plates in M. Corda's work,† and particularly to the figures of Gonatorhodon speciosa; the extreme filaments of Stysanus

* "Recherches Microscopiques et Physiologiques sur le genus Mycoderme."—Annales des Sciences Naturelles, Tom. X. 1e. Ser. 1826.

† Pracht-Flora Europæischer Schimmelbildungen, Leipzig, 1839.

Caput Medusæ; Torula Tritici; Torula olivacea; Torula frutigena; and several others.

The description of the Mycoderm of Tinea, by M. Gruby, above referred to, so accurately corresponds with the observations I have myself been enabled to make very lately, that I have thought the addition of a few figures of the appearance presented by this parasitic growth under the microscope (see Figures, p. 148), would be sufficient to prove the truth of the position, that the disease does in reality consist of such a growth, and that this growth corresponds in every respect with the characters of Persoon's genus, Mycoderma. I have not, however, been able to perceive any movement in the globules themselves, as appears by M. Desmazieres' observations, to have been the case in other species of this genus. There is, however, always to be observed in the fluid with which the Mycodermata may be mixed, a great number of actively moving molecules or minute Infusoria.

This Mycoderm is readily seen by placing a fragment of a crust of *Porrigo*, moistened with water, between two glasses. The younger crusts present many of the small branched filaments and separate corpuscles; the larger crusts contain more of the beaded filaments, and in all, *the Mycodermata are found mixed with epidermis scales.*

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## XXXII.—AN ABSTRACT OF THE "INFUSIONSTHIERCHEN" OF EHRENBERG.—No. 4.

*By W. Hughes Willshire, M.D., M.B.S., Physician to the Fore Street Dispensary, &c.*

*Genus*—DOXOCOCCUS.

EYE, projecting lip, and tail not present; position of oral aperture varying with respect to the direction towards which the animalcule is swimming; motion *rolling*, similar to the clusters of UVELLA; spontaneous self-division simple, perfect, or none. In other respects they resemble the *Monades*.

Four species are known: one is of a brick-red colour, another of an obscure green, a third whitish with green spots, and the fourth is colourless.

*Genus*—CHILOMONAS.

Eye and tail not present; projecting lip present; mouth lateral or oblique, provided with cilia (?) or with a very delicate filiform proboscis (double ?); spontaneous self-division perfect, or none.

The members of this genus are well characterised by the oblique position of the oral aperture with respect to the longitudinal axis of the body, and by the presence of the protuberant lip. The creatures move in the direction of the longitudinal axis of the body.

Three species are known: two are devoid of colour, and the remaining one is of a pale yellow hue.

*Genus*—BODO.

Eye and projecting lip not present; tail present; mouth terminal; spontaneous self-division simple, perfect, and bipartite, or none.

The presence of a caudal appendage sufficiently characterises the species of the present *genus*. It may be remarked, however, that the solitary individuals sometimes cluster voluntarily, forming mulberry or grape-like masses.

Eight species are known: one is of a green colour, the rest are colourless.

*Bodo socialis* is one of the Infusoria most frequently met with in stagnant spring water, and vegetable infusions. Three other species are parasites.

## FAMILY II.—*CRYPTOMONADINA.*

Polygastric animalcules provided with a hard or soft lorica, and in other respects possessing all the characters of MONADINA, or, at least, not possessing any of the characters of other tribes of Infusoria: spontaneous self-division simple, perfect, or none.

All self-moving, free, and minute microscopic organisms, possessing the characters of the tribe MONADINA, or not presenting those of any other family, and not enclosed in a general or common envelope, but in consequence of their self-division being perfect, or absent altogether, are free and solitary, and separately enclosed in a special gelatinous, membraneous, or hardened lorica, belong to the family CRYPTOMONADINA.

*Prorocentrum.*

The following is a Synoptical Table of the Genera :—

- Organ of sight not present
  - Lorica obtuse and smooth
    - Form short; self-division longitudinal or wanting — CRYPTOMONAS.
    - Form elongated, tortuous; self-division transverse — OPHIDOMONAS.
  - Lorica acuminated anteriorly — PROROCENTRUM.
- Organ of sight present
  - Lorica, with a neck or narrowed orifice — LAGENELLA.
  - Lorica without a neck or narrowed orifice
    - Lorica an open shield, or *scutellate* — CRYPTOGLENA.
    - Lorica a closed case, or *urceolate* — TRACHELOMONAS.

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*Genus*—CRYPTOMONAS.

Eye not present; anterior extremity obtuse; form short, not filiform or elongated; spontaneous self-division longitudinal, or none.

The species of this genus are like those of CHILOMONAS; but the latter are destitute of a lorica.

Seven species are known: five are of a green colour, the remaining one is brown.

*Genus*—OPHIDOMONAS.

Eye not present; lorica obtuse glabrous; form elongated, or filiform; spontaneous self-division transverse.

One species is alone described: this is of a brown colour.

*Genus*—PROROCENTRUM.

Eye not present; lorica glabrous, terminating anteriorly in a point.

One species is known: this is of a yellow, waxy hue, and is one of the phosphorescent Infusoria met with in luminous sea-water.

*Genus*—LAGENELLA.

Eye present; lorica rostrate, or with a neck, or narrowed orifice.

One species is known: this is of a beautiful green colour.

*Genus*—CRYPTOGLENA.

Eye present; lorica open like a buckler, and rolled in at the edges (scutellate); not rostrate or necked.

Three species are known: these are of a green colour. One is found in water when of a temperature near the freezing point.

*Genus*—TRACHELOMONAS.

Eye present; lorica a closed case, or urceolate, not rostrate, or provided with a neck.

Three species are known: two are of a green, one of a dark brown colour.

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## Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

*Unger on Chrysomyza Abietis.* — Under the name of *Chrysomyza Abietis* is described by Unger, in F. J. F. Meyen's Jahresbericht, &c., for 1839, a peculiar exanthem of the Fir. He states, that the leaves assume a yellowish red colour, owing to the presence of prominent, linear, rusty brown spots, without being themselves otherwise swollen. The yellow colour is more or less diffused on the upper side of the leaf; but on the under side, besides this diffused colour, there are found one or more rusty brown spots, placed in a double row on the sides of the projecting leaf-veins. The situation of these spots corresponds, nearly always, with that of the Stomata. In the young state they are more opaque, and become when older more transparent, and more defined. The degeneration consists in a multitude of elongated vesicles, which are confined in a mucoid matrix containing granules, sometimes coloured, and sometimes colourless. This matrix forms an outer covering to the vesicles, and gives them occasionally a varicose appearance. They contain a yellowish grumous matter. The colour is not dissipated by boiling in alcohol. The disease commences in the stomata, which, in place of the air, contain a granular, mucous, at first uncoloured substance, which rapidly increases, becomes coloured in parts, and flocculent particles are formed in it. The vesicles appear, and it finally bursts through the cuticle. The course of the complete development of the disease lasts above a year.—*Abridged, p.* 92.

*Valentin on Achyla prolifera.*—With reference to *Achyla prolifera*, Valentin remarks, that this mouldiness, or colourless Conferva, very often recurs under favourable circumstances in animals. When occurring on the ova of fishes, it constitutes a very powerful preventive to their development, and its progress is so rapid that a single egg infected with it, will in a very short time infest many hundreds, and thus destroy them. He has ascertained, also, the same thing with regard to the ova of *Alytes obstetricans*. Its action upon the eggs of mollusca appears to be slower, which has been already remarked by Laurent.—*(Rep. V, p.* 44.*)* Valentin observed it, at all events, in a state of active growth for several days upon the ova of (probably) *Limnæus stagnalis*, during which period the embryo was in lively motion, and which did not die till later. In fishes, also, as the *Cyprinus nasus*, when kept in narrow vessels, and the water not quite sweet, he observed the same fun-

gus on all parts which might be abraded, as, for instance, the head and the tail.—*p.* 58.

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[From the *Comptes Rendus*, 1841.]

*On a new Process for Anatomical Injections.**—M. Doyere, in a letter addressed to the Academy of Sciences, Paris, July 12, 1841, gives the following account:—I have employed for nearly two years, a very simple process for obtaining fine injections. This process, which I believe likely to render some service to the anatomy of structure, and probably also to pathological anatomy, essentially consists in causing to enter in the same vessels, *within a certain interval of time*, two finely filtered saline solutions, which, by double decomposition, give an abundant and opaque precipitate. This succession of two injections, is that which distinguishes my process from many others tried without success to obtain the injection of the capillary system by the same principle. I inject the second solution, as soon as the first has passed from the arterial system into the venous and lymphatic systems.

I have tried on animals a great number of insoluble salts, with a view to determine those which would give the most satisfactory results. I prefer to all others the chromate of lead. I first inject the chromate of potass, and am convinced that the order of injection is a point not to be neglected. A blue colour may be obtained by the precipitation of Prussian blue; brilliant red by iodide of mercury; white by the carbonate or sulphate of lead. The first has better succeeded with me than the carbonates and sulphates of lime and baryta.

The advantages which this process appears to me to possess over those in use, are above all to shorten the process of making fine injections, and to supersede any other preparation. It may be used with equal advantage cold or hot, in general or partial injection; the materials employed are unalterable, and may be consequently always ready. I will add, that the most minute injections required only a pressure which was evidently less than that of the heart's action. M. Poiseuille, to whom I made the process known several months since, in order that he might make use of it in his particular researches, has constructed an instrument by the assistance of which he can inject either liquid with that degree of pressure he considers proper.

By the assistance of this process, I have more than once succeeded injecting by the femoral artery in a single operation, and in a few minutes, the capillaries of the muscular system in an entire animal, the adipose and cellular systems of the white and grey matter of the

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* Although the priority of discovering this process, and publishing the same, are decidedly due to M. Doyere, yet we must here state, that we have for upwards of twelve months seen injections of the corpuscles and Haversian canals in bone, the tubes on the fibre of some sponges, &c., similarly prepared by our esteemed correspondent Mr. George Busk, Surgeon to the Hospital Ship, Dreadnought. We can vouch for his not being acquainted with M. Doyere's process, the account of which bears date July 12, 1841.—*Editor.*

brain, of the conjunctiva, of all mucous membranes, intestinal villosities, &c. The capillaries thus injected by the chromate of lead are more filled, especially after drying, than by the injections of size, but less than by those of varnish (vernis); there also remains some doubt in my mind relative to the actual diameter of the latter canals. Those which run parallel to each primitive muscular fasciculus, to the number of four or six, appeared to me to possess, in the dog, $\frac{1}{300}$th or $\frac{1}{400}$th of a millimetre; but it is possible that their dimensions had been reduced by the action of one or the other of the two solutions employed, or that they had not been sufficiently filled. I am now engaged in determining the relation which exists between the size of injected vessels, and their size during life.

*Bowman on the Contraction of Voluntary Muscles.*—At the sitting of the Academy of Sciences, 27th September, 1841, Mr. J. E. Bowman, Demonstrator of Anatomy, King's College, London, stated, that he had sufficiently proved, that contraction never takes place in the whole length of a primitive fasciculus at the same instant, but that even the most violent contraction consists of partial contractions, which change their place with an inconceivable quickness.

*Researches on the Reddening of Waters, and their Oxygenation by Animalcules and Algæ.*—MM. C. and A. Morren are of opinion that the oxygen of the air in water varies in quantity at different hours of the day. For example: in very sultry (insolation) days, the quantity of oxygen in the morning is 24 parts in 100; at mid-day, 48 parts in 100; and at five o'clock, from 60 to even 61 parts in 100. This effect is in relation with the respiration of animalcules, and aquatic Algæ. Among the bodies which produce this effect, there is an animalcule which the authors have made their particular study, and to which the name of *Discerea purpurea* has been given. It is one of a number which colour water red. The same authors have further examined the phenomenon attendant on the red colour of waters, and have enumerated forty-two plants and animals which redden liquids. They have particularly noticed the *Monas vinosa* of Ehrenberg, the *Monas rosea*, the *Trachelemonas volvocina*, the *Euglena sanguinea*, the *Hæmatococcus*, and the *Tessararthra*, of which they have given monographs. According to these observers, the famed *Protococcus nivalis* of the snow is an animal.—30*th August*, 1841.

*M. Soleil* presented a Microscope of M. Donné, to which he had added an Adjusting Screw, rendering it much more handy and useful. —*July* 19, 1841.

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*Laurent on colouring Hydra.*—He has succeeded in colouring the Hydra blue, white, and red, by feeding them with indigo, chalk, or carmine; but he remarked that the eggs did not partake of the colouring, although the parent acquired a very vivid tint.—*Guerin's Rev. Zool.*, *June* 1841, *p.* 204.

*Turpin on the Acarus of Pears.*—Under the epidermis of the fruit of

some pears, Turpin once found a great number of the genus *Acarus*, of an oval shape, furnished with claws close to the beak, and four posterior filaments, presenting nothing very remarkable except four articulated legs, terminated by a single slightly-arched nail. The young individuals, after molting, assume their eight legs.—*Mem. de l'Acad. Instit. Paris*, 1840, *p.* 56.

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## PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

*October 20th*, 1841.—*Prof. R. Owen, F.R.S., &c., President, in the Chair.*

Mr. Thompson, of Belfast, forwarded some Fossil Infusoria from earth, obtained at Cork.

Mr. J. Quekett read a paper "On the minute structure of Bat's Hair." After alluding to the views entertained by Hunter, Mandl, Busk, and others, as to the formation and mode of growth of hairs generally, the author stated that his attention was directed to those of the bat tribe, in consequence of having on more than one occasion used a knife to separate them from the skin; on subsequent examination it was seen that the curious markings on their surfaces, which render these hairs so interesting, were destroyed in some parts, but were still present in others. By repeating the scraping process, it was found that minute scale-like bodies were detached, which were not unlike in shape the scales on the wing of a butterfly, but were very much smaller, and presented no trace of striæ on their surfaces; it was on the arrangement of the scales, and on their being more prominent in some species than in others, that the beautiful appearance of bat's hair depended. The scales might be procured either by scraping the hair with a knife, in a direction from the apex towards the root, or more easily by pressing them between glasses previously moistened by the breath. Many of them appeared to terminate in a quill, like that observed on the butterfly's scale; some few were flat, whilst others were curved so as to fit the shaft of the hair, and presented a serrated edge. The scales were absent near the bulb, but abounded in all parts of the shaft situated above the skin; and when removed from many of the larger hairs, the fibrous nature of the shaft, and its cellular interior were well displayed. Mr. Quekett spoke of the hair of an Indian bat, of which a small portion had been given him by Mr. Powell, in which, without any preparation, the scales could be beautifully seen, both detached and still adherent to the shaft; and he was led, from repeated observation, to consider a bat's hair as composed of a shaft invested with scales, which are developed to a greater or less degree, and vary in the mode of their arrangement in the different species of these animals; and concluded by stating, that bats resembled quadrupeds principally in their mode of reproduction, and birds in their mode of progression, but resembled both in the structure of their hair.

Mr. Bowerbank called the attention of the meeting to a source of fallacy he had detected in using strong solutions of salt and water, for

the preparation and preservation of animal tissues for microscopic purposes. He stated that he had recently been much occupied with observing the animal of the stony corals, which is exceedingly simple in its structure; and that he had observed numerous fasciculi, or networks of apparently small vessels in its structure, which had led him at first sight to arrive at conclusions as regards their formation. By accident he found that this network of apparent minute vessels, was due to the development of a *Confervoid* vegetable in the brine, of extreme delicacy.

Some discussion ensued on this subject, in which Mr. Owen and Mr. D. Cooper took part.

Mr. George Busk exhibited, after the meeting, a species of the genus *Acarus*, obtained from a pustule on a sailor's leg, which appeared to be a new species. The disease was contracted at Sierra Leone, by wearing the shoes of a West Indian. The matter was referred for further investigation.

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## PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

*October 7th*, 1841.—*Sir Henry Marsh in the Chair.*

The minutes of the last meeting having been read,

Mr. Bergin moved, and Mr. Callwell seconded, that the first Thursday in November be considered the Anniversary of this Society; when a report from the Secretary of the proceedings of the year, and from the Treasurer as to the funds, shall be presented, and the officers for the ensuing year be elected. Agreed to.

Mr. Yeates presented the description of his Modified Compressor, an account of which will be given in a future number.

Mr. Moore presented a species of Alga, which he believes to be undescribed.

Mr. Ball exhibited some portions of mud, lining the valves of a dead specimen of *Cytherœa Chione*, taken up at Plymouth, July 1841, which contained a number of remarkable forms, accompanied by rough sketches of them.

The Right Honourable the Bishop of Meath was proposed by Sir H. Marsh, seconded by Dr. Croker, and admitted a member of the Society.

Notes on the Plants (?) exhibited at the meeting of the Microscopical Society of Dublin, on Thursday, 7th October, 1841, by Mr. D. Moore, were then read.

*Polysiphonia fibrillosa (?)* if not, new to our marine Flora. The microscope showed the ultimate ramuli of this beautiful species, beset with fibrillæ in a remarkable degree; the main filaments many-striated, and both kinds of fructification perfect. The specimens, which were collected at Malahide, are much smaller in all their parts than English specimens of *P. fibrillosa*, and further disagree in general appearance from them.

*Gomphonema ampullacea*. Greville. — This singular substance has twice occurred to Mr. Moore in great abundance; once in the North, and again in the West of Ireland. It appears to be in perfection from July to September.

*Gomphonema paradoxa.* Greville. — Frequent on the Irish coasts.

*Isthmia obliquata* (Diatoma obliquetum, *Lyngbye*). This beautiful object occurs abundantly in one or two places in the North of Ireland, but is very local. It is in perfection in July and August.

*Fragilaria pertinalis.* Lyngbye. — Collected in the county Westmeath, on Belvidere Lake, adhering to aquatic grasses in August.

*Licmophora flabellata.* Agardh. — This, when well displayed, is one of the most beautiful microscopic objects in the whole order of Algæ (Agardh), or Infusoria (Ehrenberg).

*Diatoma fasciculatum.* Agardh. — Frequent on the Irish coast: attached to other Algæ.

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## Microscopical Memoranda.

*Topping's Objects illustrative of the Process of Felting.*—We have recently received from Mr. C. M. Topping (whom we had occasion to recommend to the attention of microscopists at page 16 of our Journal) a set of *twelve slides*, containing the hairs of various animals, the fur or wool of which is used for felting. The objects are numbered according to their tendency to felt, and, independent of their being generally interesting as objects of structural beauty, they are the more so to those particularly interested in the subject as a branch of manufacture. We recommend the set to all classes of observers.

We observe that Mr. Topping uses strips of mahogany veneer, (instead of slips of glass) with a hole bored through the centre for the glass to fix the object upon. This is a decided improvement over the old plan.—*Editor.*

*Organic Beings in Mineral Waters.*—Dr. Lankaster communicated some additional observations on the existence of organic beings in mineral waters (*Athen.* No. 674). He had found the *Conferva nivea* of Dillwyn in the sulphur spring on the Water of Leith, near Edinburgh. He had also found it in the wells of Moffat in Dumfriesshire, Gillesland in Northumberland, and Middleton and Croft in Yorkshire. At Moffat he found great quantities of the substance called *glairine*, and was convinced of its organic nature. At Moffat also he found a pink deposit in the drains outside the wells, and, on submitting it to the action of the microscope. he found that it was produced by an animalcule, but much smaller in size than those which produced the coloured sediments of Harrowgate and Askern. It had the characters of a Monas, and was not more than $\frac{1}{15000}$ of an inch in diameter.—*Athenæum, Aug.* 7, 1841.

*Insects voided with Urine.*—The specimens kindly forwarded us by Dr. R. S. Hopper, of Leeds, which are stated to have escaped in large quantities *per urethram* from a female, appear to belong to the larva of a Dipterous insect of the genus *Stratiomis* (Westw. Classif. Vol. II, p. 551). The specimens are referred for further investigation.—*Editor.*

## XXXIII.—DESCRIPTIONS OF THREE SPECIES OF SPONGE, CONTAINING SOME NEW FORMS OF ORGANIZATION.*

*By J. S. Bowerbank, Esq., F.G.S.*

The first specimen described in this communication, was a *Halichondria*, which the author has named *H. Johnstoniana*, in honour of Dr. Johnston of Berwick-upon-Tweed. The sponge is sessile, massive, and has a smooth encrusted surface, of a dark iron-grey colour; the interior is of a dull yellow colour, and much resembles the crumb of bread. This sponge is remarkable for the great variety in the forms of the silicious spicula, of which the author described three distinct kinds, each of which is characteristic of a separate part of the animal:—1st. Those of the skeleton, which are mostly simple and slightly curved, having hemispherical terminations; they are occasionally tri-radiate or multi-radiate, and frequently branched. 2nd. Those of the interstitial fleshy matter of the sponge; these are minute stellate bodies, having their rays attenuating regularly to their apices, the number of the rays varying from three to ten or twelve. 3rd. The spicula of the crust or surface of the sponge; they are very minute and somewhat fusiform, terminate abruptly, and have their surfaces regularly tuberculated. The author also described a fine vascular tissue, which he observed on the surface of the great excurrent canals. The gemmules are oval bodies, having a silicious crust, which is filled with minute spicula. This species was found attached to the Thatcher Rock, near Torquay, Devonshire.

The second sponge described belonged to the new genus *Duseideia*, proposed to be established by Dr. Johnston in his "History of British Sponges."

This species was sent from Sydney, Australia, by Rupert Kirk, Esq., after whom it is named, *D. Kirkii*. It is sessile, massive, and somewhat compressed. The skeleton is coarsely fibrous, and coralloid in appearance, having numerous *grains of sand* separately imbedded *in its substance*. The grains are not imbedded in the fibre from pressure through the external surface, but they occupy its very centre; each grain being separately encrusted by the cartilaginous matter of the skeleton, and the whole being surrounded by a thick coating of the same substance. The author described at length the mode in which this

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* Abstract of a paper read at the Microscopical Society of London, Nov. 24th, 1841. Communicated by the Author.

curious structure appears to have been built up, and illustrated his descriptions by highly magnified drawings of the manner in which the grains are arranged in the fibrous skeleton. Spicula were of rare occurrence in this specimen; when observed, they were embedded in the external coating of the cartilaginous fibres; they are short, and comparatively thick in proportion to their length, decreasing very slightly from the middle to near the points, and are terminated acutely, but somewhat abruptly.

The third species is the *Spongia fragilis* of Montagu, or *Duseideia fragilis* of Dr. Johnston's manuscript.

It is massive, variable in form, of a dull ochreous yellow colour, and has the surface asperated by the projection of fibres, which contain numerous grains of sand, embedded in a manner similar to those described in treating of the last species. There are also other fibres, which are tubular in their structure, containing few or no grains of sand, but an abundance of spicula, remarkable for their great variety in form and size. No spicula were found in the fleshy matter of the sponge, but a considerable number of round or oval bodies were observed, which presented every appearance of being cytoblasts.

The author concluded his paper by some observations on the present state of our knowledge of the structure of the *Spongiadæ*, and noticed certain changes that will become necessary in their systematical arrangement, when our information regarding their structure is more matured.

Drawings of the species described, and the various forms of spicula contained in their structures, illustrated the paper.

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## XXXIV.—OBSERVATIONS UPON THE IMPORTANT PART WHICH MICROSCOPIC ORGANISMS PLAY IN THE CHOKING UP OF THE HARBOURS OF WISMAR AND PILLAU; ALSO IN THE FORMATION OF THE MUD WHICH IS DEPOSITED IN THE BED OF THE ELBE, AT CUXHAVEN, AND UPON THE AGENCY OF SIMILAR PHENOMENA IN THE FORMATION OF THE BED OF THE NILE, AT DONGOLA, IN NUBIA, AND IN THE DELTA OF EGYPT.*

*By M. Ehrenberg.*

During the course of the year 1839, M. Ehrenberg made special researches upon the form of the mud-banks in the harbour of Wismar in

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* Report of a memoir read to the Berlin Academy of Sciences, in March 1841, extracted from Professor Jameson's Edinb. New Phil. Journ., Oct. 1841, p. 386.

the Baltic, and arrived at the following result, which he communicated to the *Societé des Amis des Sciences Naturelles*, on the 18th of February, 1840; namely, that from $\frac{1}{20}$th to $\frac{1}{4}$th of the mass of deposited mud consisted partly of living Infusoria, and partly of the empty shells of siliciously enveloped and dead Infusoria. Last year, 1840, he repeated these researches, and obtained a precisely similar result.

In the harbour of Wismar, according to the documents which were officially communicated by M. Rose, it appears that every week 36 lasts of this mud are deposited, every last weighing 6000 lbs.; so that it may be deduced, after seven and a half months of observation, that there is an annual deposit of 1080 lasts, or of 32,400 metrical cwts., or of 6480 cubic metres. For a century, and probably more, matters have proceeded in this way without interruption; so that during the last hundred years, there have been deposited by the running waters at Wismar, 108,000 lasts, equal to 3,240,000 cwts., or 648,000 cubic metres of this mud. Hence, then, supposing, which is very nearly correct, that $\frac{1}{10}$th of this mass consists of visible organic matter, there have been deposited at Wismar, during the last century, of these microscopic silicious organisms, 64,800 cubic metres, or annually 648 cubic metres, which, when dry, cannot constitute more than $\frac{1}{10}$th, and probably not more than $\frac{1}{40}$th, or even less of the total weight.

The results which have been obtained at Wismar in the year 1840, suggested the idea to M. Hagen, to make similar experiments upon the deposits at Pillau, and to communicate his observations. The specimens of the deposits which he transmitted to M. Ehrenberg, are still richer in organized beings than those of Wismar. They often constitute, according to the result of forty experiments made upon different samples, one-fourth, and sometimes even a half of the entire volume. Hence it will follow, that at Pillau, also, there are annually separated from the running waters, from 7200 to 14,000 cubic metres of pure microscopic organisms, which in the course of a century would supply, in this place alone, a deposit of from 720,000 to 1,140,000 cubic metres of Infusory-rock or Tripoli-stone.

Both at Wismar and Pillau there are to be met with in the organized materials, some forms which are entirely new, and others which belong to the waters of the ocean. As it regards the last-named harbour, which is in the channel called *Pillau-Haffe*, the north wind often causes the sea-water to flow into the river.

M. Ehrenberg also alludes to the researches he made concerning the muddy deposits of the river Elbe at Cuxhaven, and which were submitted to the attention of the Berlin Academy in the year 1839. These muddy

deposits also appeared to be composed, to the extent of nearly half their volume, partly of Infusoria with silicious heads, and partly of Polythalamia with calcareous heads.

To these observations M. Ehrenberg now adds the results of his recent observations upon the mud of the Nile, the deposit of which has, from the remotest period, attracted the attention of the curious. He has purposely compared with this mud, African deposits procured from Daebbe and Ambukohl, in Dongola: from Tangeur, in Nubia; from Thebes and Gyzeh, in Upper Egypt: from Boulak, near Cahira; and from Damietta, in Lower Egypt. He has also in his possession specimens of the ancient deposits of the Nile, which M. Parthey and Lieutenant-General Minutoli brought to Berlin. In all these specimens he has found that the Sponges, the Silicious Infusoria, and, especially from the neighbourhood of Damietta, the calcareous Polythalamia of the arable districts on the margin of the Nile, existed in such vast abundance, that without going the length of asserting that they absolutely predominate, still it is a fact, that there is not a particle of this soil of the size of half a pin's head in which, making no allowance for the chemical changes which may have taken place, there was not one, and frequently many of these animals.

We may now, therefore, safely affirm, that the deposits in harbours, and even the accumulation and the extraordinary fertility of the mud of the Nile, and probably of all other river deposits, proceed not solely from the gradual destruction and mechanical transport of one portion of solid soil to the formation of another, no more than they are solely the product of the vegetation of plants; but, on the contrary, that they result from the immensely rapid agency, hitherto scarcely recognized as vital, of animal organisms, which are undiscernible to the naked eye, but whose quantitative and natural limits must henceforward be inquired into, and which, from this time, must be considered as possessing a very important influence upon these natural phenomena.

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## XXXV.—AN ABSTRACT OF THE "INFUSIONSTHIERCHEN" OF EHRENBERG.—No. 5.

*By W. Hughes Willshire. M.D., M.B.S., Physician to the Fore Street Dispensary, &c.*

### FAMILY III.—*VOLVOCINA.*

Polygastric animalcules having a uniform body destitute of true ap-

pendages or members, provided with an envelope or lorica, dividing by spontaneous self-division into numerous individuals within the extensile lorica, and hence assuming a polypoid appearance. Lorica at length bursting, and allowing the several animalcules to disperse when they have arrived at the due degree of maturity.

The following is a Synoptical Table of the Genera :—

- Organ of sight not present
  - Caudal appendage not present
    - Lorica single
      - Lorica roundish
        - Vibratile proboscis not present — GYGES.
        - Vibratile proboscis present — PANDORINA.
      - Lorica tabulated or compressed — GONIUM.
    - Lorica double — SYNCRYPTA.
  - Caudal appendage present — SYNURA.
- Organ of sight present
  - Self-division equal and perfect (forming no secondary polypoid masses)
    - Caudal appendage present — UROGLENA
    - Caudal appendage not present
      - Proboscis single — EUDORINA.
      - Proboscis double — CHLAMIDOMONAS.
  - Self-division unequal (forming secondary polypoid masses)
    - Proboscis single — SPHAEROSIRA.
    - Proboscis double — VOLVOX.

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*Genus*—GYGES.

Eye and tail not present; lorica single, urceolate, subglobose; creature destitute of a vibratile filiform proboscis.

Only two species are described; the several creatures within the common envelope being of a green colour.

*Genus*—PANDORINA.

Eye and tail not present; lorica single, urceolate, subglobose; creature provided with a vibratile filiform proboscis. From the peculiar mode of self-division, the polypoid-like mass has somewhat the form of a mulberry.

Species two: one is green, the other colourless.

*Genus*—GONIUM.

Eye and tail not present; lorica single, developing by spontaneous self-division, in flattened, tabelliform, and square polypoid masses.

Five species are known: four have green animalcules within the transparent general lorica, the other is colourless.

*Genus*—SYNCRYPTA.

Eye and tail not present; lorica double—clustering Cryptomonades enclosed within a common envelope.

Only one species is described: this is of a green colour.

*Genus*—SYNURA.

Eye not present; tail present, attached to the base of the lorica or to the centre of the polypoid mass.

Species one: of a yellow colour.

*Genus*—UROGLENA.

Eye and tail present; division of corpuscles simple and uniform.

After self-division has taken place once within the general lorica, the creatures resulting from such division do not divide into secondary polypoid masses.

Species one: creatures of a yellowish colour, with a red eye.

*Genus*—EUDORINA.

Tail not present; eye and filiform proboscis present; division of corpuscles simple and uniform.

Species one: of a yellow colour, and has a red eye.

*Genus*—CHLAMIDOMONAS.

Tail not present; eye present; filiform proboscis, double; division of corpuscles simple and uniform.

Species one: corpuscles green, with a red eye.

*Genus*—SPHAEROSIRA.

Tail not present; eye present; filiform proboscis simple; division of corpuscles compound and unequal.

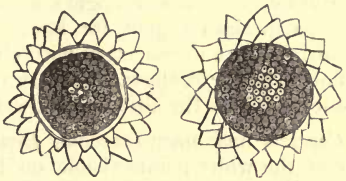
After general self-division has taken place within the common envelope, the creatures resulting from such division again divide, forming secondary clusters.

Species one: of a pale green colour; the eye is red.

*Genus*—VOLVOX.

Tail absent; eye present; filiform proboscis double; division of corpuscles compound and unequal.

Three species have been described: all of a green colour.



## Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

*Swäbe upon the Development of Boletus destructor.**—It first appears, according to him, as a fugitive growth (auflug) of a dirty green colour, consisting of fine, simple, microscopical filaments, somewhat transparent, and covered with minute, round, greenish germ-globules, and in this respect resembles the *Dematium virescens* (Pers.) This fugitive growth is converted afterwards into fine cobweb-like threads, interwoven with thicker branched filaments of a yellowish colour. Under the microscope both sorts of filaments appear colourless, exceedingly transparent and curved. One portion of them lies closely together, and they become glued in their position by a yellow resinous substance. The yellow branched filaments become gradually thicker, and at last assume the form of a rhizoma, with a brownish rind and transparent in the centre. The fibres in the latter resemble the colourless one above described. Those of the rind are more slender, less transparent, of a dark brown colour, and interwoven. The outer extremities of the rhizoma-like body, consist of very fine filaments, which have some resemblance to *Oscillatoria punctata*. In spring and summer, and especially in a moist atmosphere, they become, as it were, woven into a dry silky texture, on which the germ powder is again formed, whence a new growth of the Fungus commences.—p. 81, 82.

*Mohl on the Colouring of Vegetable Membranes by Iodine.*—From the numerous experiments of Mohl, which are recorded in the Flora, a universal Botanical Journal by Hoppe and Fürnrohr, and of which an abstract, too long for our limits, is given in Valentin's Repertorium 1841, it would appear, that colours varying from brown to blue, may be produced in all vegetable membranes, when placed in a condition to absorb a large quantity of Iodine. A yellowish or brown colour is caused by the application of the Iodine in a state of vapour, and a violet or blue by very concentrated solutions. He further concludes, that the reception of Iodine, and consequently the colouring, is in proportion to the consistence of the membrane. The weaker and softer, and more absorbent membranes, being the more ready to assume the blue colour. Schleiden agrees with these statements, and concludes, as was already

* Schlechtendahl's Linnæa, p. 194—200.

proved by his own and Vögel's experiments upon Amyloid, that Iodine is not a special re-agent for starch only, and that generally the blue colouring has no connection with chemical combination. He, however, is not disposed to allow, that only the consistence of part of the membrane regulates the absorbing power.

*Crystals and other Inorganic Deposits in Plants.*—The greater number of the white points visible on the outer integument of the bulb of *Muscari comosum*, consist, according to Goeppert, of larger cells, which are aggregations of four-sided prismatic crystals, placed nearly parallel to each other, and pointed at both ends. Payer also (Froriep's Notizen. No. 335, p. 65-68), has examined a number of these deposits in plants; as, for instance, in the leaf-stalks of several species of *Ficus*, *Parietaria officinalis*, &c., *Urtica nivea*, and *Forskalea tenacissima*. Others more cylindrical, in *Celtis Australis*, and *C. Missisipiensis*, and those in the leaves of *Morus nigra*, *M. alba*, and *M. multicaulis*. They are found at the base of the hairs in *Broussonetia papyrifera*, and *Humulus Lupulus*, and *Cannabis sativa*, and are peculiarly remarkable in the leaves of *Conocephalus Naucleiflorus*. A single large leaf of the *Broussonetia papyrifera* contains 134,000 of these concretions. Carbonate of lime is frequently met with in these deposits, between the cells of the parenchyma of the leaves, or their ribs, in the ducts of the leaf-stalk and its base. It is present in these situations, even in leaves of so acid a juice, that this would necessarily dissolve the carbonate of lime, were they in contact. Oxalate of lime, which is usually distributed in the leaves of plants, appears, as in the stems of *Cactus*, in transparent aggregated crystals, in the form of spheroids covered with points, and enclosed in a membrane, and sometimes also as octahedral or octangular prisms. *Raphides* consist of an investing membrane filled with oxalate of lime. Silex incrusts many vegetable membranes, and is seen also in the shape of orbicular concretions.

*Link on the Structure of Coal.**—Link (Froriep's Notizen, No. 320, p. 117-81) has established from comparative microscopical researches, that the greater part of coal originates not from mineralized stems, but from the peat or turf of the ancient world.—p. 79.

*References to recent Foreign Works on the lower Cryptogamia.*—For foreign information about the lower Cryptogamia, we refer our readers to:—

Turpin.—Journal de l'Institut. No. 328, p. 126, "On the *Penicilliam Biottii*, a species of Mould which is formed in solutions of Dextrine."

Amidi.—Atti della prima ricenione degli scientziati Italiani tenuta in Pisa nell, Ottobre de 1839, Pisa, p. 157, "On the *Uredo Rosæ*."

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* We are informed by Mr. Robert Warrington, that from frequent observation of the extensive peat districts in Scotland and the north of England, he has long entertained the opinion, that the coal formation has originated from this source, which the investigations of M. Link fully confirm.—*Editor.*

GÖPPERT.—Uebersicht der arbeiten, &c., der schlesischen gesellschaft &c. fur 1840, Breslau 1841, " On the structure of *Pisolithus arenarius*."

KÖRBER.— Id. p. 95, 99, " Upon the relation of the *Gonidia* with the *Soredia* of lichens."

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[From *Müller's Archives*, 1841.]

*On the circulation in the Infusoria.*—Dr. Erol of Munich, in a letter to Professor Müller, says, " I have now very often seen and shown to my friends about here a kind of circulation in the Infusoria, a phenomenon so remarkable that I cannot but wonder that it is not mentioned by any microscopic observer. I find it most distinctly in the *Bursaria vernalis*, whose abdomen, you know, appears to be quite full of green globules. Of these globules, those which lie near the periphery of the animal are incessantly moving, whether the animal itself be still or not, in an elliptic current upwards and downwards. In this current three or four globules always lie close by one another, and move together with the stream. It has no relation whatever to the vivid ciliary motion that is constantly going on at the outer surface."—*Heft.* 3, 1841.

*On the Development of the Hair. By Dr. G. Simon of Berlin.*—All the investigations into this subject, which are possessed of any real value, are comparatively recent. For most that is important, we are indebted to the researches of Heusinger, Gurlb, Henle, Mandl, Busk, and Bidder; but many points have been still left undetermined, to some of which Dr. Simon has directed his attention.

Heusinger has stated that a black discolouration of the skin precedes the formation of the hair. Simon found this substantiated by the appearance of the skin in the embryos of the pig, and ascertained, as Heusinger had done before him, that this colour is produced by small black granules, which lie very close together. In some embryos this was not perceptible, while in others part of the skin was white, part discoloured. This difference of colour was owing to the presence of white corpuscules in the place of the dark granules. These bodies are formed of small sacs, running from the epidermis in a very oblique direction into the corium, which begin with a narrow neck, and terminate in a rounded pouch. They are in hair follicles, and are formed a considerable time before any hair can be observed in them. The only difference between the white and the dark follicle is, that the walls of latter, in addition to being formed of a granular matter, are furnished with a layer of pigment cells.

At the bottom of the hair sacs of some embryos six inches long, a dark mass was seen, perfectly distinct from the lining of pigment, and closely resembling in form the root of the young hairs. This mass too, was observed in some sacs unfurnished with pigment cells, and was composed of rounded granules in close apposition with each other, and very similar to the pigment cells in the rete malpighii of the human skin. Another circumstance, too, which renders it extremely probable

that this is the root of the young hair, is, that in no follicle containing pigment cells, was the mere point of a hair ever found, but the young hair always appeared complete, though very small. In those sacs which were not lined with dark pigment cells, the hair had the appearance of terminating in very minute fibres, but this was without doubt owing to the transparency of the cells of which the root of the hair is composed. Henle and Bidder's opinion, that the hair is formed from the cells at the bottom of the hair sac, is very probable, but most likely, the nuclei of the cells undergo the transformation into the fibres of the hair, and not the cells themselves, as Bidder imagined.

After the hairs have acquired such a length as not to be capable of being contained in the sac, they become bent into loops in such a manner, that while the point and root of the hair are near each other, at the bottom of the sack, the top projects out of the cavity. This condition of the hair existed in embryos seven or eight inches long; in others from eight to twelve inches in length, the points of the hairs, and part of their shaft projected from the sac, but were covered by a membrane which invests the whole fœtus, and which was imagined by Isben to be a prolongation of the amnion. To this notion, notwithstanding some difficulties which oppose its adoption, Dr. Simon inclines.

In addition to the true sac, all the hairs of the embryo of the swine have a second investment contained within it, and analogous to that part which Henle termed the sheath of the root, in his description of human hair. This sheath is perceptible in hairs which are still entirely contained within the follicle, when it presents the appearance of a transparent line on either side of the hair. In no instance, however, were any traces of this sheath perceptible before the hair was formed. The sebaceous follicles connected with the hair sac, exist before the formation of the hair. They differ in structure from the sebaceous follicles in the full-grown pig, and consist of an elongated pouch, apparently divided into compartments by transverse lines, and occupying the upper part of the hair sac. One end of this pouch terminates close under the opening of the hair sac by a conical or elongated point, and its lower extremity is composed of an appendix of round granules bearing some resemblance to a bunch of grapes. When the hair follicle contains a young hair, this appendix is frequently divided by it into two lateral lobes, which project beyond the borders of the hair follicle on either side. Each of these lobes, which still retains the appearance of being composed of rounded granules, continues connected with the pouch, either immediately, or by means of a delicate prolongation, divided, like the pouch itself, into transverse compartments. Whether these sebaceous glands undergo subsequent metamorphoses, by which they are brought to resemble the condition of those parts in the adult animal, or whether new follicles are formed when the fœtal hairs drop out, and the bristles begin to be developed, has not yet been ascertained.

Dr. Simon confirms the opinion that a distinct cortical and medullary substance exists in the hair; though when the hairs are black, the cortical substance presents as dark a colour as the medullary matter. He instituted experiments on the human hair to disprove Mandl's recent

assertion, that the tips of the hair are capable of being more or less perfectly reproduced; and lastly, by examining the development of the hairs in the embryos of the dog and calf, he has ascertained that his observations on the pig hold good with reference to other animals.—*Heft.* 4. *Transl. in Lond. and Edin. Med. Journ.* 1841.

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[From the *Annales des Sciences Naturelles,* 1841.]

*Lallemand on detecting Spermatic Animalcules.*—M. Lallemand enters at some length into the pathological conditions connected with the evolution of spermatic animalcules in man, and points out the mode by which they may be detected under a variety of circumstances, a few abstract notices of which we subjoin:—After every discharge of the fluid, there remains always sufficient in the urethra for microscopic examination, a single drop of which affords myriads of animalcules in active motion; and as the fluid evaporates from between the plates of glass, the addition of water of the temperature of the body, renders their movements more free. M. L. also finds that the animalcules are always found in a living state in the urethra, some time after the act of coition; and recommends that the first drop of urine should be collected on a piece of glass, in order to view them in the best manner, as the warmth and dilution of the secretion by the urine, favour much the rapidity of their motions. The fluid so obtained is frequently mixed with mucus, prostratic fluid, and portions of epithelium. This test has been found of considerable importance to the physician.

Out of thirty-three subjects which M. L. examined after death, he only met with two cases in which he could detect the spermatic animalcules in the gland; the one died subsequent to a fall on the previous day, and the other of acute gastro-enteritis.

The microscope affords a very ready method of determining the nature of secretions from the urethra, though they become dried on linen. If a spot be supposed to be that of semen, and if it contained at the time of its emission spermatic animalcules, by moistening the same with water they are found to regain their former or original state, even after some years, and to possess the aspect and odour characteristic of the secretion. They may also be detected in urine, when the semen is voided with that fluid; in such cases they are to be found at the bottom of the vessel in which their presence is supposed, and if any mucus be present, on the surface of that substance.

[Those of our readers who may be further interested in this subject, are referred to the original memoir of M. Lallemand, as given in full in the January and February numbers for the present year.]

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*Glüge's method of detecting Urea in the Blood, after the removal of the Kidneys.*—By the aid of the microscope, this observer can detect the presence of urea in the blood; for, says he, "Urea in its pure and crystallized state, forms fine needle-shaped, shining, or very slender quadrilateral prisms. After the kidneys were removed from rabbits, I ex-

amined the blood, having allowed it to rest for some hours, by the aid of a power of 255 times; and even twenty hours after extirpation, the blood *presented the two forms of crystallization of which I have spoken.*" In order to avoid every kind of error, experiments were instituted, and the results were always the same.—*Bull. Acad. Sc. and Belles Lettrés, Brux.* 1839, *Part I. p.* 302

*Horkel* read a paper at the meeting of the Academy of Sciences, Berlin, 17th May, 1841, "On the Microscopic Investigations made by Franciso Stelluti, in the beginning of the Seventeenth Century." This communication is not yet published by the Academy.

*Apparatus for viewing the Circulation of the Blood in a very simple and ready manner, adapted for Public Lectures.*—This apparatus is composed of a small box enclosing a frog, the tongue of which is easily placed for viewing the circulation of the blood, in the arteries, veins, capillaries, and even in the interior of the follicles. A compound lens is adapted to this box, opposite to a hole which allows the direct light of the sky, or that of a wax candle, according to circumstances, to fall upon it. A low power is sufficient to see the circulation of the blood in the interior of the tongue drawn out of the mouth of the animal, and spread like a membrane. One of these apparatusses presented to the Academy, was constructed by M. George Oberhauser; the other by M. Soleil, optician, after the pattern of M. Donné.—*Comptes Rendus*, 1841, *p.* 799.

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## Bibliographical Notices.

*The employment of the Microscope in Medical Studies; a Lecture introductory to a course of Histiology. By John Hughes Bennett, M. D., Lecturer on Clinical Medicine, &c., Edinburgh.* Edinburgh: Machlachlan & Co. London: S. Highley. Dublin: Fannin & Co. 1841. 8vo. Pamphlet, pp. 27.

The time has at length arrived, when it has been deemed expedient to institute a Class in Edinburgh, for instructing the rising members of the profession in the manipulation of the Microscope. This really becomes daily the more necessary, seeing that the scientific practitioners throughout Europe, are resorting at length to this means, with such acknowledged advantage and success. Dr. Bennett has passed some considerable time with Continental Microscopic Observers, and is fully competent to the difficult task he has engaged in, and in which we heartily wish him every success. It will be a matter of surprise to us, if the London Medical Schools do not appoint Professors for the same purpose; and this appears really the more looked for and demanded, seeing that the many sources of error which creep into the experiments made by the tyro, are too apt to cause him hastily to publish results, and thus render more confusion in the science than is necessary, which a few hints from one experienced in making such observations would

tend to obviate, and direct him in the proper path. Indeed, it is somewhat surprising, that the Senate of the University of London, many of whom have distinguished themselves as Microscopic observers, and have gained their laurels by the use of the instrument, have not made it requisite for students in human, vegetable, and comparative anatomy and physiology, to attend at least *one* course, even were it to consist only of *twelve* lectures on the Microscope. Such a proceeding in the Metropolis would materially lead to the most beneficial results, as it would create a desire for investigation among students and professors, who for the most part are ignorant of the *actual* appearance and nature of the structures, of which in theory they may be so well versed. The time is, we feel convinced, not far distant, when the Microscope will be considered as essential as the scalpel in the hand of the anatomist.

Dr. Bennett, in the pamphlet before us, has taken every pains to detail the ignorance which prevails among those who are fully conversant with book-knowledge, and the inspection of plates of structure, but who are entirely unacquainted with the objects themselves, and cites examples in substantiation of his assertions. He then enters, in a very general and popular manner, on the history and importance of microscopic investigations in the study of anatomy, physiology, pathology, and the practice of the profession; in which he gives an excellent though very general summary of the existing state of Microscopic Science in these departments.

To those interested in such details, we strongly recommend the perusal of this pamphlet, and again express our wish, that the laudable object Dr. Bennett has commenced, in the establishing of a Class for Microscopic research in Edinburgh, may be attended with that success it so richly deserves.

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*The Principles of Botany, Structural, Functional, and Systematic. By W. Hughes Willshire, M.D., Edinburgh, M.B.S., Lecturer on Botany at the Charing Cross Hospital, &c.* London: S. Highley, Fleet St. 12mo., woodcuts, pp. 233.

The work before us has been written with a view to supply a deficiency existing in treatises of Botany, for the student in medicine, and graduate of the University. Its title conveys its objects very precisely. The *structural* portion is replete with the most recent important information to the time of its publication, embracing the views of late promulgated by the German and French authors, given in a condensed and abstract form. As a consequence of the manner in which the structural portion is treated, the author's views of the *physiology* of plants deserve equal notice, and exhibit his intimate acquaintance with the subject. The *systematic* arrangement is essentially natural.

An abstract account is given of all those orders, under which the officinal plants are arranged, together with a list of those admitted in the London Pharmacopeia; the general properties of each order are given in a very general though condensed form, sufficient, however, to convey

the principle (which is all that is aimed at) of so important a branch of the subject.

From the reasonable price at which this summary of the existing state of Botanical Science is published, and the really excellent description of its matter, we must admit, the medical student has at length been supplied with all that can be desired.

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*The Entomologist. Conducted by Edward Newman, F.L.S.* London : John Van Voorst, Paternoster-row. 1841.

This was the first of the Monthly Journals which appeared of the size and price of our own, and is devoted to the comprehensive Science of Entomology. We regret there have not as yet occurred in its pages any original observations on the structure of insects which we could notice ; it is chiefly confined to the description of species, and the record of notes connected with the capture of insects, and for these particulars recommends itself particularly to the attention of practical men.

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## PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

*November 24th,* 1841.—*N. B. Ward, Esq., F.L.S., Treasurer, in the Chair.*

Dr. Hastings was elected a member.

A paper was read from the Rev. J. B. Reade, entitled "A Postscript to the Rev. J. B. Reade's paper 'On the process of Charring Vegetable Tissue, as applied to the Stomata in the Epidermis of Garden Rhubarb,'" in which the author, after alluding to the experiments of Dr. Williams, as communicated to the Society, in August last (see the whole paper, p. 118), which appeared to lead to the conclusion that the process of charring was of very doubtful efficacy in determining delicate structure, and that the overlying membrane in stomata was really nothing more than an inspissation of organic mucus, raised by heat into contact with the glass, and by the pressure extending as a carbonised pellicle from one edge of the aperture to the other. With reference to the point in dispute, the author forwarded with the communication a portion of cuticle, which, after being immersed in alcohol, distilled water, and dilute hydrochloric acid, was, when perfectly dry, examined by a high power, and the membrane distinctly seen; it was more evident after the process of charring, and which process was so conducted as to obviate all error arising from pressure. The tissue was placed on a slip of glass, and submitted to the action of heat without being covered by another slip. Thus, both the supposed sources of error were avoided; the one by the previous removal of organic mucus, and the other by a different manipulation. The paper was accompanied with sketches of the stomata, by Mr. Lens Aldous, the power employed being about 2000 linear. The author concluded by stating, that Dr.

Williams, after seeing the membrane under this power, immediately approved of the process which rendered it so distinctly visible.

Mr. J. S. Bowerbank then read a paper, being "Descriptions of three species of Sponge, containing some new forms of organization," a full abstract of which will be found at page 161 of this Journal. This paper led to much discussion, in which the Author, the Chairman, Mr. Dalrymple, Dr. Willshire, and others, took part.

On the table was the Microscope which the Council ordered for the Society from Mr. James Smith. This instrument possesses many modifications and improvements, both in the construction of its framework and appurtenances, and in its optical parts. We hope to be able at some future opportunity to give them in detail.

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## Microscopical Memoranda.

*David Don on a peculiar kind of Organs existing in the Pitcher of Nepenthes distillatoria.*—These organs the late Professor Don named "clathrophores;" they occupy the lower half of the inside of the pitcher, and have been described by Treviranus, Meyen, and Korthals. Doubts still exist as to their precise function; but it appeared to him probable either that they are the mouths by which the fluid is poured out into the pitcher, or that they are connected with the function of respiration.

The cuticle of the upper surface of the expanded part of the petiole of *Nepenthes distillatoria* is described as destitute of stomata; that of the under surface, as being furnished with numerous oval, or nearly orbicular stomata, composed of two semicircular cellules with rectilinear faces. That of the outer surface of the pitcher is also without stomata, but covered, especially in the young state, with long subulate hairs, frequently dichotomous, or furnished with a spur-like process at their base. The outer surface of the operculum is sparingly furnished with stomata, and clothed with hairs which are frequently branched and fasciculate; the inner has no stomata, but is furnished with clathrophores and clothed with hairs, which are often fasciculate, but mostly simple.

In *Sarracenia purpurea* the cuticle of the pitchers is described as consisting of sinuously-lobed and somewhat stelliform cellules, with numerous small, oval, closed stomata. The fibrous bundles are stated to be composed entirely of long pleurenchyma, the parenchyma adjacent to which consists of beautiful spiral cellules. The hairs of the inner surface of the operculum are simple, hollow, reflexed, subulate, and marked with numerous longitudinal parallel lines or striæ; they proceed from a somewhat elevated base. In the pitchers of *Cephalotus* the stomata are large, oval, and closed; the spiral vessels smaller than in *Nepenthes*, and containing only a single fibre; and the hairs which form the fringed border are simple, obtuse, and transparent.—*Proc. Linn. Soc.* 1840.

*Organic Composition of Chalk and Chalk Marl.*—The following Table, taken from Mr. Weaver's View of "Ehrenberg's Observations on the Organic Composition of Chalk and Chalk Marl," in Taylor's Annals of Nat. Hist. for June, 1841, p. 311, exhibits the number of Species of Infusoria, Polythalamia, &c., met with in the specimens examined by Ehrenberg: —

| | Species of Calcareous Polythalamia. | SPECIES OF INFUSORIA. | | Species of Silicious Plants. |
|---|---|---|---|---|
| | | Silicious in Chalk. | Soft-shelled in Flint. | |
| The *Chalk* of | | | | |
| Puskary contains ..... | 6 | | | |
| Rügen ..... | 7 | 1 | | |
| Jütland ..... | 6 | | | |
| Gravesend ..... | 6 | 3 | 5 | |
| Brighton ..... | 7 | 1 | 4 | |
| Menden ..... | 9 | ..... | 2 | |
| Cattelica ..... | 9 | | | |
| The *Chalk Marl* of | | Silicious | Infusoria | |
| Caltasinetta ..... | 7 | 27 | ..... | 4 |
| Oran ..... | 2 | 18 | ..... | 1 |
| Zante ..... | 5 | 8 | ..... | 2 |
| Greece ..... | 3 | 9 | ..... | 1 |
| The *Compact Chalk* of | | | | |
| Egypt .. ..... | 8 | | | |
| Arabia ..... | 6 | | | |
| The *Nummulite Lime-stone* of | | | | |
| The Pyramids of Geza... | 6 | { Containing 4 species of Nummulites, the largest of which is one inch in diameter. | | |

*Death of Mr. David Don.*—It is with much regret we announce the decease of this talented and much respected Botanist and observer, which took place on the 7th of December, 1841, at ten minutes to One, A.M., at the apartments of the Linnæan Society, Soho Square. His remains are deposited in the Kensall Green Cemetry.

## XXXVI.—DESCRIPTION OF MESSRS. POWELL AND LEALAND'S* NEWLY-CONSTRUCTED ACHROMATIC MICROSCOPE.

THE daily acknowledged advantages arising to every branch of Natural Science from the use of the microscope, have induced us to present, after some years' experience, an instrument modified to the present improvements, and more within the reach of scientific observers, than that we have of late constructed, a full account of which, and figures of the one made for the Microscopical Society of London, will be given in a future number of this Journal.

In the following description almost every portion of the instrument is alluded to, and figures of the different parts appended; and it has been our object to give every individual credit for his improvements, where at least we consider them of such importance as to be placed on record.

The points most deserving of attention are the following:—The double pillar, as first made by Mr. George Jackson, which possesses the advantage of being lighter, and distributes the weight more equally upon the foot. We have also introduced a circular motion to turn the body off the stage to examine the object, and to change the object-glass to prevent it from falling upon the object. The stage is made larger and stronger than in former microscopes of this size, and the pinion and screw are of the same diameter as in the larger instrument, above alluded to. This description of stage was first constructed by Mr. Turrell. There are, however, two or three other improvements and modifications, such as the method for adjusting the object-glass to compensate for the thickness of the glass covering the object, &c., which will be found in the description of the Society's microscope.

FIG. 1. *The Microscope in the position for general use.*—The figure forms the frontispiece of this volume. As the most convenient method of using the instrument is in this position, it will be necessary after taking it out of the case, to turn it by means of the pillars on its

*Mr. Lealand, Mr. Powell's brother-in-law, has for some years been engaged with him in the object-glass and optical department, and is now publicly a partner with Mr. Powell.—*Editor.*

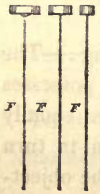
moveable foot, in order that the principal weight may be over one of the feet. When the person using it is standing, and the body of the Microscope perpendicular, it is then firmest as taken from the case.

A. *The coarse adjustment* for the body, which rests on two rollers, and is moved by a rack and pinion.

B. *The fine adjustment,* which is a screw with a cone, against which there is a spring pressing against the cradle, which carries the compound body.

C. *Milled head,* which moves the stage to the right and left.

D. *Heads that move the stage at right angles to the other.* (C) —There is one head on each side of the stage to this motion, in order that both hands may be employed at the same time, one on C, and the other on the opposite side, when a rotatory movement is required to search for animalcules, or other objects. When the two screws, C and D, are used together, a diagonal motion, and when separate, motions at right angles with each other are obtained.




E. *Arm for holding the stops,* FFF, which are used when viewing opaque objects. — To place them for use, push down the mirror G to the extremity of the stem; put the stop into the spring-hole, turn it into the centre of the stage, and raise it as high as the slide on which the object is placed will admit of.

G. *Mirror for illuminating objects.*—When the concave side is used it should be raised nearly to the stem, in order that the rays of light proceeding from it may reach the object before crossing, for by this means the most intense light is obtained. It is invariably used for opaque objects, together with the Lieberkuhn. At night it will be necessary to use the larger condensing lens, which should be placed at about its focal distance from the lamp, with its convex side to the mirror, and adjusted till the rays of light fill it.

H. *Spring-piece for holding the slides on the stage.*—The most convenient mode of placing them is, to push up the spring-piece sufficiently high to allow the slide to go on the stage, and then compress it until it holds it. Any number of slides of the same width may then, after it has been set, be put in without that trouble. Should the slides be very wide, in order to have the whole range of the stage, it will be necessary to observe if the centre of the slide corresponds with the line on the centre of the stage; if not it must be altered until it does.

Fig. 2. *Achromatic Condenser.*—This is adapted under the stage. It

will be observed there are two notches in the plate, capable of admitting the two springs on the condenser; put it in, and turn it till the milled head is in the best position for use; bring your object into focus, and adjust the condenser till you see distinctly the image of the lamp, or the frame of the window, if by daylight; and then you may be assured the most intense light is obtained, which is not always desirable. The light is lessened or diminished by turning back the condensing lens, by means of the milled head.

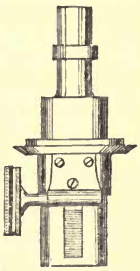


*Fig. 2.*

FIG. 3. *Micrometer for measuring objects.*—The upper part of the stage is taken out of the plate, put into the micrometer, and the whole put again on to the stage. To measure an object, observe that the micrometer stands at nought; then adjust one edge of the object till it comes in contact with the web in the eyepiece, by the milled head C; then adjust it across by the head of the micrometer D, when the number of revolutions and points may be taken.

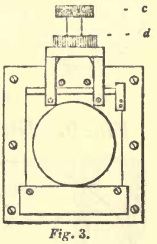



*Fig. 3.*

*Fig. 4.*

FIG. 4. *Plate on which Frogs or Fish are tied to examine the circulation of blood in the vessels.*

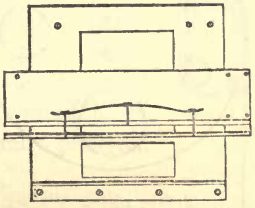


*Fig. 5.*

FIG. 5. *Large Stage, used when the Frog Plate is used.*—To examine the circulation of the blood in the web of the foot of the frog, or the tail of a fish, it must first be enclosed in the bag; then fastened on the plate by the holes in either side of it; then tie some thread to about four of its toes, and spread the web out by fastening the ends through the holes in the plate.

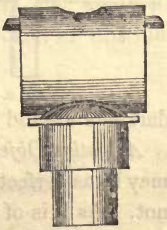


*Fig. 6.*

FIG. 6. *Phial holder for viewing Chara, &c. while in a living state.*—It is adapted to go in the plate of the stage, and is put in after taking the upper part of the stage off.

FIG. 7. *Small Condensing Lens for viewing opaque objects by direct light, the stem of which goes into the hole* (I).—The larger lens should first be made to throw as intense a light as possible on the objects, and the small one should intercept the rays at about two inches from the object. When the large lens only is used, which is the case when viewing opaque objects by daylight, it should be placed at about three inches from the object, with its plane side towards it: this produces light intense enough for many objects, without the smaller one; but when that is used, the plane side of the large lens should then be towards the lamp.

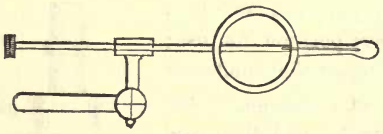


*Fig. 7.*

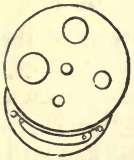


*Fig. 8.*

FIG. 8. *Diaphram for cutting off extraneous light when viewing minute transparent objects.*—It is adapted under the stage, in the same manner as the achromatic condenser.

FIG. 9. *Diaphram of French construction.*—Which is used in front of the lamp, to cut off extraneous light, and intercept the rays before they reach the mirror. It goes into the stem of the *large* condensing lens, which is easily drawn out, and the diaphram substituted. It should be placed at about eight inches from the mirror, and if an image of the aperture is obtained in the body, but a small portion of the field of view will be illuminated. The size will depend upon which aperture is used, and the relative distances of the mirror from the object, and the diaphram from the mirror; it is useful, when any very delicate structure is to be observed, as the darkness around the object renders the markings more distinct.

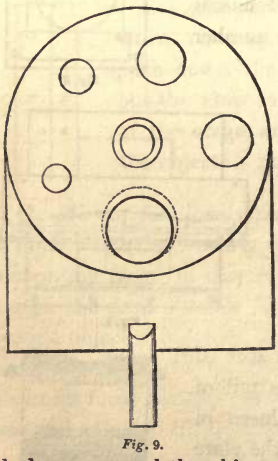


*Fig. 9.*

*Adjusting Object-glasses.*—These are made to adjust, in order that they may be as perfect for viewing objects covered with glass, as those that are not. As it is of material consequence that the object-glass should adjust to suit the various thicknesses of glass that are used, and as it is impossible to measure accurately the thickness, the best method to adjust the object-glass is this:—Place it at the point for viewing objects uncovered, which will be known by observing that the circular line under the word *uncovered* corresponds with the fixed line; or, the more ready

way is, to adjust it down as far as it will allow, as we always make them to stop at the corrected point. Bring the object into focus by the adjustment of the body, then adjust the object-glass till the upper surface of the glass which covers the object is in focus; this can very readily be done while the person is observing, by taking between the finger and thumb the milling on the object-glass, and turning it to the left; then bring the object again into focus by the body, and the adjustment is perfect. For the principle of this important method of correcting object-glasses for looking through glass, we are indebted to Mr. Andrew Ross.

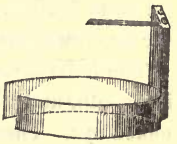


*Fig.* 10.

Fig. 10. *Steel Disc, by which Drawings are made.*—To use it, place the body of the Microscope horizontally, take the cap off the eye-piece, push on the disk to the line marked upon the long eye-piece, and adjust it till the arm is horizontal.

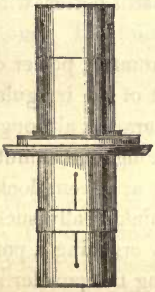


*Fig.* 11.

Figs. 11 & 12. *Prisms for polarizing or decomposing the Light.* — One (Fig. 11) is adapted under the stage, in the same manner as the achromatic condenser, the other in the body of the Microscope, the draw of the body is taken out, and the prism screwed in, and the draw replaced. The polarization of light can be seen by turning round the draw in the body, or the prism under the stage: the latter is generally preferred as being the most easy.

*Fig.* 12.

[The price of the Instrument above described varies from forty to sixty guineas, depending upon the number of powers and apparatus attached thereto; a very complete Microscope, however, of this kind may be obtained for about forty-five guineas.—*Editor.*]

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## XXXVII.—ON THE EXISTENCE OF CRYSTALS OF CARBONATE OF LIME IN THE EGG-SHELL OF THE ALLIGATOR.

*By Dr. Henry Johnston, of Shrewsbury.*

In the September number of this Journal (p. 108), it is stated, on the authority of M. Turpin, that the particles of carbonate of lime which give substance to the shells of birds and reptiles, are deposited in confusion, molecule by molecule, and not in a crystalline form, as occurs in the eggs of *Cryptellæ* and *Helices*.

I am unable, at present, to obtain access to the original paper of M. Turpin, and therefore, to ascertain whether he examined particularly the egg-shell of the alligator; but I infer that, as one of the reptiles, his observation equally applies to that animal.

Some eggs of the alligator having recently been given to me, I was curious to examine the structure of the shell, and I was much surprised, knowing what M. Turpin had written on the subject, to detect in them, what appeared to me, decided indications of a crystalline arrangement.

The egg-shell of the alligator consists of two layers. The inner is thin and flexible, not at all crystalline, and indeed seems to be merely the inner membrane dried.

The outer layer is thicker and stronger than the former. Its exterior is smooth, and its interior studded with minute eminences, visible to the naked eye. These appearances may be seen in the following manner:

1. If the light be allowed to fall obliquely on the thin broken edge of this layer, minute shining points, or *facets*, are seen here and there, with the assistance of a single lens of low power,* or, still better, with the higher power of a compound microscope.

2. When viewed as an opaque object, with an achromatic power of about fifty linear, the inner surface is seen to consist of an irregular semi-transparent mass, having quite a crystalline appearance, although no regularly formed crystals can be perceived. Among the minute eminences above mentioned, many slender white fibres are seen, looking much like acicular crystals, but which are not, I think, really such.

3. The crystalline structure is best seen, by carefully crushing a portion of the outer layer in a mortar, and then examining the powder as an opaque object, on a dark ground, with a power of about fifty linear, or more. The particles are clear and transparent, almost like crystal; they are not amorphous, but have a great tendency to break into more or less regular fragments, bounded often by straight lines, and the fractures are clear and shining.

Although I have not been able to discover the regular rhomboidal crystals which M. Turpin has elsewhere detected: yet, I think it is proved by these observations, that the substance of the egg-shell here spoken of consists of particles of carbonate of lime, so disposed as to form not an amorphous mass, but a crystalline structure, such as we see in loaf-sugar, white marble, &c. The inside shell is almost entirely animal matter, and leaves but little residuum when burnt upon platinum.

It is with the greatest diffidence that I advance an opinion in any

* A Coddrington lens of thirty linear.

way contrary to the conclusions of M. Turpin, I am however induced to communicate these few remarks, in order to draw the attention of English microscopists to the subject.

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## Hints to Microscopists.

### III.—ON PRESERVATIVE SOLUTIONS FOR MOUNTING ANIMAL STRUCTURES.

*By Daniel Cooper, Esq., Surgeon, &c.*

*Goadby's Fluid for mounting Animal Tissues.*—Mr. Goadby, whose name is familiar to most of our readers, has lately received a gold medal, from the Society of Arts, for his fluid-preparation for preserving animal structures, and thus supplying at once a ready, cheap, and effectual means to the microscopist of mounting animal structures with the greatest possible ease and security, and affording the anatomist and physiologist that which has been for so long a time a great desideratum. The following is the receipt for making Mr. Goadby's fluid: —

4 Ounces of *Bay Salt.*
2 —— of *Alum.*
4 Grains of *Corrosive Sublimate.*
2 Quarts of *Boiling Water.*

These ingredients are to be well stirred, and the solution finely filtered.

Preparations immersed in this fluid are reported to keep their colour well, even those possessing a very delicate rose tint. I have examined the blood-corpuscles, and various other normal and abnormal secretions, which had been preserved for upwards of a fortnight in it, without suffering any material alteration either as regards their form or colour. This solution is also applicable for preserving zoological objects generally. When mounting objects for the microscope, provided they are not thick, place a few drops of this fluid upon a piece of glass, on which the object has been previously put, and cover it with a portion of thin glass, wipe at the moment all the superfluous moisture from the edges of the surrounding glass, and by means of a brush apply japanner's gold size, so as to cover the upper and under glass to the extent of the eighth or sixth of an inch all round. By adopting this means, the fluid in which the object is placed is prevented from evaporating, and exercises its preservative influence over the enclosed object.

*The Gannal process* for preserving animal structures from decomposition, consists in injecting with, or immersing objects in, a solution of

the *super-acetate of alumina*. There is, however, the *same* objection, though to a greater extent, to the use of this fluid as to the salt water.

*A mixture of salt and water* was first recommended by Dr. Cook for the same purpose, and has been known for more than twenty years. There is a serious objection to the use of this solution for microscopic preparations, owing to the development of a *Confervoid* vegetable, as noticed by Mr. Bowerbank, at p. 159.

Mr. J. T. Cooper some years since made some experiments with a view to determine the best fluid for preserving vegetable coloured tissues, such as some of the smaller Fungi, and found that *salt and water*, to which *acetic acid* had been added, answered extremely well for this purpose. This solution might probably answer for mounting dissections of vegetable structures.

*Kreosote and oil of copal*, with the above, have likewise been tried, but have not been generally used, probably on account of the difficulty of obtaining the former free from colour, and the expense of both, compared to the simple ones above described.

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## Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

*Will on the Compound Eyes of Insects and Crustacea.*—Some excellent researches, illustrated by good figures, have been published on this subject, by Will of Leipsig. The author found the investigation more convenient in subjects prepared in spirit than in fresh ones. The facets of the cornea are hexangular in all insects, but in Crustacea sometimes quadrangular, sometimes hexangular; quadrangular in *Palæmon serratus*, *Galathea strigosa*, *Astacus fluviatilis* and *marinus*, *Palinurus locusta* and *Pasiphæa squinado*; hexangular in *Squilla mantis*, *Pagurus bernhardus*, *Portunus pubes* and *Ilia nucleus*. The two eyes occasionally vary in size. In the *Libellulæ* the facets in the upper part of the eye are at least one-third larger than the rest. In the *Gryllotalpa vulgaris*, those on the border of the cornea are about one-third smaller than the others. The cornea is made up of prisms, or truncated pyramids, corresponding in number to that of the facets. Each pyramid presents, on a vertical section, oblique striæ, usually more than five, probably the edges of horny plates placed upon one another. In *Ranatra linearis*, *Naucoris cimicoides*, *Cicada orni*, *Tabanus bovinus*, there are found external and internal layers; the former transparent, the latter less so. The surfaces of both extremities of the corneal pyramids are always convex, or at most level, but never concave. In *Galathea strigosa*, *Palæmon serratus*, *Astacus fluviatilis*, and other Crustacea, the external extremities of these pyramids are very slightly convex, the internal even. In *Cetonia aurata*, *Melolontha vulgaris*, *M. fullo*, *Calosoma sycophanta*, *Dytiscus marginalis*, *Staphlylinus erythropterus* and

*Gryllotalpa vulgaris*, both ends are convex; the internal, however, much more so than the outer. In *Locusta viridissima* both are very slightly convex. In *Mantis religiosa* almost even. In *Vespa crabro*, *Apis mellifica* and *Bombus*, convex, the inner most so. In *Æschna grandis*, *Agrion virgo*, *Libellula depressa*, slightly convex, the inner being much so. In *Cicada orni*, slightly convex, the inner strongly so. In *Cossus Ligniperda*, *Sphinx Atropos*, *Pontia Brassicæ*, *Vanessa Urticæ*, *Musca domestica*, and *Tabanus bovinus*, slightly convex, the outer appearing more so. In *Apis mellifica* and *Vanessa Urticæ*, between the facets are observed simple hairs, which extend to the inner surface of the cornea, and are placed irregularly. In *Vespa crabro*, on the inner surface of the cornea, at the border of the facets, are formed short, rounded striæ, probably indentations. The number of facets in each eye are in *Galathea strigosa* 5400; in *Melolontha vulgaris* 6300; in *M. fullo* 9400; in *Calosoma sycophanta* 4030; in *Locusta viridissima* 2000; in *Bombus* 4000; in *Æschna grandis* 10,000; in *Cicada orni* 11,600; in *Cossus ligniperda* 8100; in *Sphinx Atropos* 12,400; in *Vanessa Urticæ* 4500; in *Musca domestica* 4900, &c., &c.—*(To be continued, as soon as the next Part comes to hand.)*

*New form of vessels in Plants.*—Under the name of *Dichotomous vessels* are described by Calamai (Annales des Sciences Natur., Vol. XIV, p. 317) certain constantly forked vessels in plants, which are probably identical with the so-called Latex vessels.—p. 75.

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## Bibliographical Notices.

*Illustrations of Arts and Manufactures. By Arthur Aikin, F.L.S., F.G.S., &c., late Secretary to the Society of Arts, London.* J. Van Voorst, 1840. 12mo, pp. 372.

The materials this interesting little work contains, have been selected from a series of papers read before the Society for the Encouragement of Arts, Manufactures, and Commerce in London, by the much esteemed and respected Secretary, Mr. Arthur Aikin, who for twenty-four years held that office, and communicated many important papers, from which the work under notice has been written.

The subjects treated of are:—1, Pottery; 2, On Limestone and Calcareous Cements. 3, On Gypsum and its Uses. 4, On Furs and the Fur Trade. 5, On Felting and Hat-making. 6, On Bone. 7, On Horn, Tortoiseshell, and Whalebone. 8, The Antiquarian History of Iron. 9, The Metallurgical History of Iron. 10, On Engraving and Etching. 11, On Paper.

Of this list, there is one article which is interesting to the Microscopic observer, viz. the chapter on Felting. The various hairs used for this purpose are neatly figured from drawings made by Mr. Cornelius Varley. The micrometric measurements are added to the interesting matter which accompanies each figure, and adds very much to the general value of the work.

A special work on the Arts and Manufactures has long been a desideratum: this, Mr. Aikin has supplied so far as the extent of the present volume will allow. We can but speak in its praise, both as regards the style in which it is written, the manner in which it is got up, and the delicacy of the illustrations.

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*The Literary and Scientific Register for* 1842. *By J. W. G. Gutch, Surgeon, &c.* London: Suttaby & Co., pp. 120.

This work, bound as a pocket-book, contains, in a condensed form, a variety of practical information in astronomy, botany, chemistry, medicine, meteorology, zoology, and science in general, and *blank ruled pages for a Meteorological Register.* As a compendium for general reference on scientific subjects, it is deserving a place in the pocket of scientific men.

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## Microscopical Memoranda.

*Hair of the Moose-Deer.*—In plate I. of the present volume, is a diagram representing the appearance of transverse and longitudinal sections of the hair of the Moose-Deer, forwarded by Mr. G. Busk; in them the *external fibrous sheath*, the *regular cells*, and the *internal enlarged cells*, which open into each other, may be well seen. This figure will be again alluded to, when Mr. Busk's notes and series of illustrations of the hairs of numerous animals are inserted.—*Editor.*

*Gill's Notice of a similar Growth on the dead Larva of a Gnat, to that recorded by Dr. Stilling on living Frogs.*—In reference to the case mentioned, at p. 139 of our Journal, by Dr. Stilling, "On the formation of Contagious Conferva (?) on living Frogs," we beg to state, that on referring to the Technological Repository, Vol. V., 1829, a similar growth is described and figured by Mr. Thomas Gill, which occurred on the body of a dead larva of a gnat. We extract the description, as given by this observer, for comparison: — "The production of transparent tubes, filled at their ends with small spherical bodies, was apparent; which tubes burst as the water gradually dried up, and these spherical bodies swam about in all directions in a lively manner, the ends of the tubes generally remaining empty, and quite pellucid; orifices or openings at their ends, through which the spherical bodies had been protruded, being also visible; the extremities of others were filled with these spherical bodies. Others of the tubes also ramified and divided themselves into branches, proceeding from the main stems." The rapid growth of these filaments is particularly referred to by Mr. Gill. He further adds (Vol. IV. p. 331), that the rudiments of these tubes were found adherent to those very recently dead, so that they seem to prey upon them in the manner of other parasites; and instantly upon their death, to commence their work of decomposition.—*Editor.*

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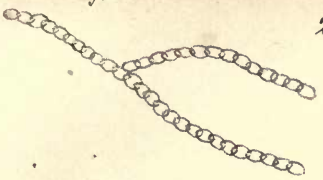
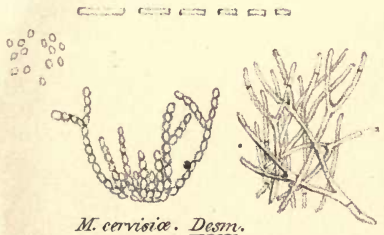
*Erratum.*—At page 148, for "Scale $\frac{1}{8000}$ of an inch," read $\frac{1}{3200}$ of an inch.

Mycoderma.

2

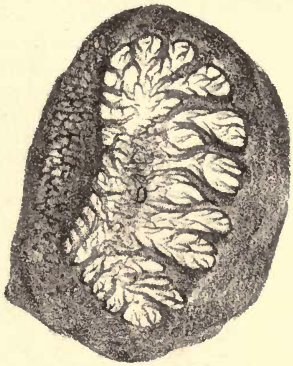


M. glutinis farinulæ. Desm.



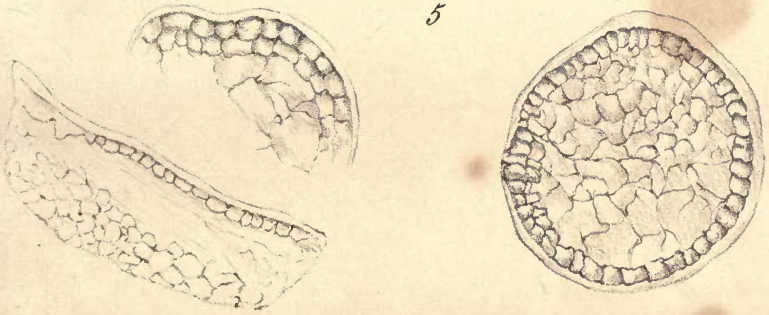
M. cervisiæ. Desm.

1



Spiraculum of Dytiscus.

5



Section of the Hair of the Moose Deer.

4

Muscardine. (Botryti.)

3

Moissisure of Eider Duck.

D. C. del.

1

1

2

3

6

5

4

*New Substance on the Human Teeth.*

2

1

3 4 3

a b c a 2

*1. & 2. Blood Discs of Siren lacertina.*
*3. & 4. Do. Do. Man.*

3

1 2 3 4

*Anatomy of Pneumonia.*

D.C. del.

## X.—On the occurrence of a new Acarus (?) from a pustule in a sailor's foot.

*By George Busk, Esq., Surgeon to the Hospital Ship, Dreadnought, &c.*

The figure of this *Acarus*, given in Plate IV., Div. 7., was found beneath the cuticle of the sole of the foot of a negro, under the following circumstances: — He was admitted into the Seaman's Hospital Ship last autumn, with large sores of a very peculiar character, and confined to the soles of the feet. On examining the secretion of these sores, the insect was found, but dead, and apparently partially crushed, as represented in the plate. It appeared that the disease was caused by its burrowing immediately beneath the thick cuticle, which thus became irregularly detached, being, as it were, undermined by galleries branching in all directions. The disease was attributed to the wearing of a pair of shoes which had been lent to another negro, whose feet had been similarly affected for nearly a year, and who wore the shoes thus lent for a day or two. The negro so under my care was a native of, and came from, the West Indies, and was not aware that a disease like his was ever known to occur there; but the negro to whom he had lent the shoes came from Sierra Leone; and this circumstance is very remarkable in conjunction with the fact, that in some water brought by Dr. Stanger from the river Sinoe on the coast of Africa, one nearly perfect specimen, and fragments of others very similar, if not of this identical *Acarus* were found, rendering it probable that the first man contracted the disease under which he had laboured so long, from some external source. It may not be, perhaps, improbably supposed, that the insect may eventually prove to be the parasite of some aquatic bird, or other animal frequenting watery places. The remains are too imperfect to allow of an exact description being given; but from all the comparison and inquiry I have been able to make from those best informed in these matters, it would appear that this *Acarus* will form a distinct genus from those hitherto described, and that it would be placed near the genera *Sarcoptes* and *Hypopus*. A not very dissimilar parasite has been found lately by Mr. J. Quekett, beneath the skin of some bird, I believe an aquatic one, and this will render the supposition I have hinted at the more probable.

[We are informed by Staff Assistant-Surgeon P. D. Murray, that at

Sierra Leone there is a native pustular disease called *craw-craw*, which is a species of itch breaking into open sores, and very troublesome to cure. May not the above insect be the cause of this intractable local disease, in the same manner as the *Acarus* is of the common itch?—*Editor.*]

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## XI.—ON A PECULIAR SUBSTANCE OCCURRING ON THE HUMAN TEETH.

*By Frederick Buehlmann, Candidate of Medicine, Berne.*

In investigating the so-termed molecules of saliva of Henle, I was struck by a peculiar kind of thread-like bodies placed on a granular mass which displays itself, mixed with the epithelium of the mouth, and with tartar, in great abundance on the teeth. I am not aware that any one, with the exception of Leuwenhoeck (Opp. omnia Lugd. Batav., 1722, Tom. II, p. 40), had ever mentioned them; I was therefore induced to examine them with the more attention, and discovered as follows.

There exist on the teeth of all adults, especially on those on which deposits of tartar occur, or which have a tendency to form such deposits, forms which consist of a great number of thread-like bodies, and which occur of three different kinds.

1. There are on a granular yellow substance of circular or elongated form, beautiful fibres, which sprout from this parent substance like plants from a bulb. This elegant form is the rarest. I have however observed it several times, and Professor Valentin has also convinced himself of its existence. The vessels occur in the form of tufts, presenting the most beautiful curves.

2. The fibres appear singly, scattered and often broken amid the epithelium, the tartar, and the adhering slime of the teeth.

3. Entire masses are observed of fibres which wind irregularly, and are surrounded by the yellow granular mass, which are perfectly identical with those described as No. 1. The first of these forms is the most beautiful, and possibly the primitive. It has on its first appearance some similarity with the spermatic animalcules which are sometimes observed of a tuft-like form, or with certain appearances of mould in the animal kingdom. The vessels have a breadth of about 0.00006-8th of a Paris inch, and a length, which, as will be seen from the accompanying figures, is extremely variable. They possess at the basis the breadth cited above, preserve this breadth till about the middle, and diminishing thence,

terminate in a point. They are smooth, of a yellowish white, somewhat transparent, are elegantly curved or wavy; or, when they occur in the second form, are occasionally quite straight, and apparently stiff. Their elasticity however admits of no doubt, as in moving the plates of glass, they frequently turned and moved in various directions. Professor Valentin believes also that their surface is not granular, and their margin not varicose; although it sometimes had that appearance, as small molecules attached themselves to the surface, which did not belong to the constituent, but to the adhering portions of the form, as was plainly observable if the object was well in focus. Professor Gerber, however, has observed both these peculiarities. Farther and more complete investigations will probably decide this point. I never saw these fibres ruptured, yet broken parts are occasionally to be seen in the second form. Single fragments of these fibres, which are cylindrical and have a broad end on each side, may be perceived. The point of fracture is straight, and exhibits no protruding portions. As regards the occurrence of these forms, I have found that they exist only on the teeth, but not on the slime; that they occur both in young and old individuals, but more frequently and more abundantly in the case of older persons, who usually pay less attention to their teeth, which on this account are coated with slime and tartar. They then display themselves chiefly in the form of Nos. 2 and 3 equally on all the teeth. I have looked for them on my own teeth, after having first very carefully cleaned them with a brush, and have found them again. They are most numerous when a portion of slime lies between the teeth, and particularly towards the bases of the last teeth. As regards their chemical composition, I can only state at present, that acids leave this peculiar substance totally unaltered, or at most, only render it somewhat more transparent. The strongest nitric, sulphuric, or muriatic acids do not dissolve it. The most concentrated solution of caustic alkali produces no alteration of form. If consumed on a plate of glass, in a platinum crucible, the surrounding mass is changed into carbon, but these fibres remain unaltered. This however is only to be observed as regards those which exist on the margin of the blackened mass; the others, though certainly not consumed, are mechanically inclosed in the black substance, and therefore cannot be discerned with the microscope.

I beg to submit this sketch as a mere preliminary notice on the subject, in order that other and more competent observers may devote their attention to these objects, hoping myself to be able to communicate more complete information at a future period.

Finally, that this substance does not belong to the enamel of the teeth, will be readily perceived by every one who has inspected the enamel itself.*

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*Explanation of the Figures, Plate* 2, *Division* 1.

Figs. 1, 3, & 4, Show the thread-like bodies as described under No. 1.

Fig. 2. Second form of the thread-like bodies, separated, and with a portion of epithelium.

Fig. 5. Third form of the thread-like bodies, surrounded by the granular mass, in which the fibres are sometimes very distinct.

Fig. 6. Single fibres of the thread-like bodies, some entire, and others probably broken.

Figs. 2 & 6, Are drawn under higher magnifying powers than the other figures.

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## XII.—OBSERVATIONS ON THE PROBABLE SOURCE AND EXTENT OF INFUSORIA IN THE MUD OF RIVERS, ETC.†

*By T. F. Bergin, Esq., of Dublin.*

Ehrenberg, who has already reaped such abundant laurels by the application of the Microscope to the Arcana of Nature, has, during the last year made another very important communication to the Berlin Academy, a translation of which by Mr. Weaver, has recently appeared in Jameson's Philosophical Journal, and of which I observe an abstract in the Microscopic Journal, Vol. I. p. 162.

I refer to his Observations on the important part which Microscopic Organisms play in Choking up certain Harbours.

Having made the truly wonderful discovery, now so familiar to every microscopist, that extensive apparent mineral beds, and, in some instances, almost mountain ranges, are composed almost exclusively of the silicious or calcareous shells of animalcules, so minute, as not merely to be invisible to the naked eye, but even to require high magnifying powers to establish their existence, he was naturally led to inquire whether similar causes were still in operation, and has arrived at the conclusion that a very large proportion of the mud banks deposited by certain rivers flowing into harbours, consists of these organisms in the living state. In fact, a moderate estimate, based upon microscopic examination of the

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* From Müller's Archiv. 1840.

† Read before the Microscopical Society of Dublin, January 1842, and communicated by the Author.

deposits at Wismar, Pillau, Cuxhaven, the Nile, and some other similar situations, shows that these organic forms amount to proportions varying from $\frac{1}{4}$th to $\frac{1}{40}$th of the whole deposit, or that the animal deposition within harbours, in some cases where circumstances admitted of an approximate measurement, amounts to many thousand cwts. annually. Such an announcement as this naturally excites the attention of every microscopist, and leads him to see whether such results are produced by all rivers, and if not, to ascertain, if possible, the cause of difference; and it is not altogether unimportant to place on record every fact, no matter how slight, bearing on so interesting a subject.

The only opportunity for observation which I have heretofore had, is as to the deposits of our own river, the Liffey. These, we know, are very great in quantity, so much so as to entail a serious expense on the curators of the navigation in maintaining dredging machines, for the purpose of preventing their accumulation to an injurious extent. The result of somewhat extended and very careful examination of these deposits during the last month (Dec. 1841) is, that they do not at all agree in character with those of the Elbe, and other rivers examined by Ehrenberg. I find but very few specimens indeed of a few species of *Navicula*, such as *N. striatula*, *N. Hippocampus*, *N. sigma*, *N. viridis*, and some few others, and heretofore I have found but one solitary *Polythalamous* shell; in fact the organic forms do not constitute $\frac{1}{1000}$th part of the mass.

Receiving then the announcement of Ehrenberg with all the confidence which any observation of that eminent man deserves, we are naturally led to inquire, Whence this remarkable difference?

The rivers, the deposits of which he has examined, flow for an immense distance through flat alluvial districts. The Liffey, and its tributary, the Dodder, both have their sources in the granitic mountains of the County of Wicklow, and within a very few miles reach the sea; in fact the waters of these rivers can be but a few hours in passing from their source to the sea, and a small portion only of their limited course is through alluvium; and to this, I conceive, may be attributed the remarkable difference. In the case of the long and slow rivers, the germs of these minute beings, received most probably from the drainage of the lands through which they flow, have time to attain maturity, and to increase and multiply; whereas, in the shorter and more rapid streams this cannot be.

It would be very interesting to examine the deposits of our great river, the Shannon, flowing as it does through almost the whole length of our Island, and, now sluggishly, now rapidly, through every variety

of soil. I hope some of our associates will do so, and let us know the result.

After having detailed his observations, to which I have referred, Ehrenberg adds that the extraordinary fertility produced by the mud deposited on the arable lands by the overflowing of the Nile, and of some other rivers, probably proceeds, not merely from the mechanical transport of soil, but from the vast mass of animal matters (the inhabitants of these minute shells) thus spread over the surface of the land.

The deposits of the river Dodder to a certain extent corroborate this view, as I know that the stuff spread over the adjoining lands, whenever it overflows its banks, produces an effect very far from fertilizing.

The notice which our friend Mr. Ball lately gave of the variety of organic forms which he observed in a morsel of mud from Plymouth Sound, bears on this point, as the rivers falling into that Sound, the Plym, the Tamar, the Tavy, and some others, all flow slowly and for a considerable distance through rich alluvial districts. It would also be interesting to examine the deposits of the Severn, the Dee, the Mersey, and as many other rivers as possible.

The subject is, possibly, not devoid of economic interest. Irrigation has frequently been resorted to for the improvement of land, but with very different results. It may be that in this discovery of Ehrenberg is to be found the explanation of these differences; and it is probably not too much to say, that an à priori examination of the mud of every river might enable the agriculturist to say whether he would derive benefit or the reverse by suffering its waters to overflow his ground.

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## XIII. — ON THE SUPPOSED STINGING ORGANS OF MEDUSÆ, AND THE OCCURRENCE OF PECULIAR STRUCTURES IN INVERTEBRATE ANIMALS, WHICH SEEM TO CONSTITUTE A NEW CLASS OF ORGANS.*

*By Professor Rudolph Wagner of Göttingen.*

It is well known that it has not yet been ascertained whether the stinging or burning power of *Medusæ*, is to be ascribed to a corrosive liquid, or to a mechanical injury. I think my investigations enable us to approach more nearly the decision of this question.

The origin of the stinging is, at all events, to be sought for in the

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* From the Archiv fur Naturgeschichte, 1841, Translated in Professor Jameson's Edinburgh New Philosophical Journal for January 1842.

external surface of the skin of the *Medusæ*. I have observed in a very beautiful and distinct manner the structure in the *Pelagia noctiluca*.* The outer skin is in that species of a beautiful brownish violet and reddish colour on the convex discoid surface, on the exterior arched edge of the arms, and on the lobes of the rim *(Randlappen.)* This variegated membrane is easily separated, especially over the greater part of the convex surface of the disc, and then there appears the homogeneous jelly-like substance which constitutes the real body of the animal. Where the red spots occur, we find, after the skin is detached, round elevations or inequalities, like warts.

By the assistance of a low magnifying power, the red spots appear like collections of very small red grains of pigment, in whose vicinity the whole body is covered by that kind of epithelium called a *Pflasterepithelium*, consisting of larger and smaller cells, which contain distinct nuclei. It is an epidermis analogous to that of the frogs and many other animals. The accumulations of pigment occur especially on the above-mentioned arched inequalities which arise above the surface, and have a substratum of muscular fibres.

Between the red grains of pigment are to be observed round balls or bubbles, out of which frequently, by the aid of a strong magnifying power (for this whole organization can only be recognised through the microscope), fine threads are seen to project. The largest of these balls present themselves as firm well-filled capsules of $\frac{1}{100}$th part of a line in size, in which lies internally a spirally rolled-up thread, which often comes out of itself, but always does so on the application of a slight pressure. This thread then appears as a whip-like appendage to the capsule, and has a very elegant outline. It is difficult to form an idea of its structure: sometimes it seems as if it had a canal. When the capsule is closed, while the thread is still rolled up in it, we perceive an inequality to which the thread, when opened up, is attached, as if to a stalk; when stretched out, the fine thread is a line long.

These hair or thread capsules are very loosely attached, and easily fall, and are rubbed off along with the slime, when the *Medusa* loses its skin; they are found in quantity, as are also the threads themselves, in what is termed the stinging slime of the *Medusæ*, (which is nothing else but the cast off epithelium), as is easily ascertained when these animals are kept in vessels. With more difficulty there are loosened smaller, long-shaped, clear little capsules, from $\frac{1}{300}$th to $\frac{1}{400}$th of a line in size,

* The examination was made at Nice and Villafranca in the autumn of 1839.

which are partially covered with fine short little hairs, or whip-shaped appendages. If we compare the reserve teeth of crocodiles, sharks, and poisonous serpents, we cannot help considering these little capsules as reserve cells, when the larger ones are lost.

Such individual little organs also exist beyond the spots, and extend to the inner rim of the arms, and to the under surface of the disc, where they cease. At the rim of the disc there hang between every two lobed *(Randlappen)*, alternating with the crystalline bodies of the edge *(Randköpern* or *Crystalldrusen)*, fine long cylindrical threads of a violet colour. These are covered with shining hairs, and present a cylindrical epithelium, which rests on the muscular fibres; these threads are covered with numerous parcels of small stinging capsules.

It is known that the slightest touch of a *Medusa* causes a perceptible burning sensation, and I, together with several pupils who accompanied me in my travels, experienced it in bathing. This ensues more feebly or more strongly, according to the vigour of the animal. *Medusæ* only sting at parts of their bodies where the epidermis is preserved. We never experienced the sensation when we came in contact with portions in which the epidermis had been removed; a circumstance which happens frequently in living animals. If we place a separated portion of a *Medusa*, with its epidermis side on the bare skin, or if we rub off a little epidermis and apply it to the skin, a burning sensation is felt after a period of from a few seconds to a minute; after five minutes a slight redness appeared in my case, and then a simple lentil-shaped elevation, more frequently three or four, near one another. *Medusæ* swimming in the sea act much more strongly, and even the eruptive appearances called *Quaddeln* are produced, as in the case of *Essera* or *Urticaria*. The pain soon ceases. It lasted half a day with one of the party, Dr. Will, and after eight days, a redness was still perceptible.

The internal substance of the body (the so-termed jelly of the *Medusæ*) never stings, nor does the inner surface of the cavity of the stomach, nor the inner surface of the arms, where the pigment spots, the capsules, and the hairs are wanting. At the parts of the skin on which I allowed myself to be stung, I always found separated capsules and hairs. It is well known that all *Medusæ* do not sting; and, for example, I found no power of this kind in the *Cassiopea;* a microscopic investigation proved the absence of those capsules and hairs over the whole surface of the disc. On the other hand, an *Oceania* (allied to the *Cacuminata*) stings, but only with the edge threads, and in a much smaller degree than the *Pelagia*. An examination showed the

existence of capsules, but of a lengthened shape, with fine long threads. But these organs were much smaller and finer; they had a remarkable resemblance to the structures I described formerly as *Spermatozoa* of the *Actiniæ*. A new investigation of the *Actiniæ*, as, for example, of the *Actinia cereus*, convinced me that those structures formerly described as *Spermatozoa* are nothing else but stinging threads of the *Medusæ;* they stand closely studded round the feelers or arms, and on the exterior surface. The threads project from long-shaped capsules, with that remarkable movement which I have elsewhere described, and which I found again precisely as formerly. The same organs, but only in a different form, occur again in *Polypi*, as Ehrenberg and Dr. Erdl (one of my companions) found in the *Hydra;* and the latter discovered them also in *Veretillum*.

It is probable that the stinging has a mechanical and chemical origin; just as in the majority of what are termed poison-organs, we find a liquid which collects in a little bladder or capsule, and an apparatus capable of doing injury. So it is also with many stinging plants, as the *Loaseæ*, in which fine sharp hairs convey a juice, where circulation can be so beautifully observed.

More extended researches regarding these structures, provisionally considered as stinging organs, will make known much that is remarkable in reference to their occurrence, arrangement, structure, and movements, and will display great riches in respect to phenomena of organization.

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## XIV.—ON THE BLOOD-DISCS OF SIREN LACERTINA.*

*By Professor Owen, F.R.S., &c.*

Among the important generalizations which the numerous observations of recent microscopical anatomists have enabled the physiologist to establish, respecting the form and size of the blood-discs in different classes of animals, the most interesting seems to be that which Professor Wagner has enunciated respecting the relation of the magnitude of the blood-disc to the persistence of the branchial apparatus in the Batrachian order of Reptiles, on the occasion of his description of the blood-discs of the *Proteus anguinus*.

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* Extracted from the Penny Cyclopedia, Art. Siren, Sept. 25th, 1841.

The absolute size of these particles in that perennibranchiate reptile, in which they may be distinguished by the naked eye, renders them peculiarly adapted for minute investigations into the structure of the nucleus and capsule of the blood-disc; but the value of the relation between their size and the persistency of the external gills, must depend upon the correspondence of other perennibranchiate reptiles with the Proteus in this respect. The superior size of the blood-discs of the newts to those of the land salamanders and tailless Batrachians has been confirmed by Professor Van der Hoeven's observations on the blood-discs of the gigantic newt of Japan, (*Sieboldtia*, Salamandridæ, Vol. xx, p.p. 331, 332), of which a fine specimen has been for several years kept at Leyden; and I have been able to add another instance to the still greater relative size of the blood discs in the perennibranchiate reptiles, by the examination of those of the largest existing species of that family, the *Siren lacertina*, of which a specimen, twenty inches in length, is now (Oct. 15th, 1841) living at the Zoological Gardens. The blood was obtained from one of the external gills, and immediately subjected to examination. The blood-discs presented the eliptical form which hitherto, without exception, has been found to prevail among the air-breathing oviparous vertebrated animals; the ellipse was not quite regular in all the blood-discs; several were sub-ovate, a few slightly reniform and thicker at the more convex side; all were as compressed or disc-shaped, as in other Batrachians, with the nucleus slightly projecting from each of the flattened surfaces.

The nucleus did not partake in the same degree with these varieties of form, but maintained a more regular elliptical form; the varieties in question appearing to depend on pressure acting upon the capsule and the coloured fluid surrounding the nucleus. Yet when the ellipse of the blood-disc was, as it happened in a few cases to be, longer and narrower than the average, the form of the nucleus presented a similar modification of size.

The following is a table of the averages of many admeasurements of these blood-discs, made with one of Powell's screw micrometers :—

| | | |
|---|---|---|
| Long diameter ..... | $\frac{1}{450}$th | of an English inch. |
| Short diameter ..... | $\frac{1}{850}$th to $\frac{1}{870}$th | " |
| Long diameter of the nucleus ..... | $\frac{1}{1000}$th | " |
| Short diameter of ditto ..... | $\frac{1}{2000}$th | " |
| Thickness of ditto ..... | $\frac{1}{3800}$th | " |

(As viewed edgeways covered by the capsule.)

The nucleus was circumscribed by a double line, the outer one more

regular than the inner one, which appeared crenated. This appearance was due to the structure of the nucleus, or the contents of the nucleolar capsule, which was indicated by the outer line. These contents consisted, in every blood-disc examined, of a number of moderately bright spherical nucleoli sufficiently distinct to be counted, when viewed by a Powell's $\frac{1}{10}$th inch objective, with the eye-piece magnifying 700 linear diameters; the ordinary number of nucleoli seen in one plane or focus being from twenty to thirty; the total number was of course much greater. The facility, as well as certainty of the demonstration of such a structure in a good microscope of the present day, will be readily admitted, when it is remembered, that the nucleus of the blood-disc of the Siren is three times the size of the entire human blood-disc. These tuberculate nuclei, when removed from the capsule, were colourless; the component granules or cells have a high refractive power; viewed *in situ*, they present a tinge of colour lighter than that of the surrounding fluid interposed between the nucleus and the capsule.

The external capsule of the blood-disc is smooth, moderately resisting, elastic, as was easily seen by the flattening of the parts of two blood-discs that might come in contact, and the recovery of form when they were floated apart.

As the fluid contents of the blood-disc in part evaporated during the process of desiccation, the capsule fell into folds in the interspace between the nucleus and the outer contour, these folds generally taking the direction of straight lines, three to seven in number, radiating from the nucleus.

### *Explanation of the Figures, Plate I., Division 2.*

Blood-discs of Man and Siren, drawn by the Camera lucida, under a magnifying power of 700 linear dimensions.

3, Human blood-discs. 4, Ditto, viewed edgewise. (The upper portion of this figure has been drawn too wide; it should be the same as the lower part, 2, Siren's blood-disc. 1, Ditto, viewed edgewise. *a*, Folds of external capsule, produced by desiccation. *b*, *c*, Nucleoli; the capsule of the nucleus, seen enclosing the nucleoli.

## Hints to Microscopists.—No. IV.

### XV.—PRACTICAL POINTS CONNECTED WITH ILLUMINATION, ETC.

*By Daniel Cooper, Surgeon, &c.*

*Lamps for Microscopic Purposes.*—There is perhaps no greater difficulty the Microscopist has to contend with in his evening examinations than the obtaining a certain and sure light. It is a general opinion that there is none so certain, and can be equally relied upon, as the ordinary Argand lamp, well trimmed, and burning the very best sperm oil. But as the price of sperm oil is high, expedients have been resorted to out of number to burn *vegetable oils* of a much lower price, with the same advantage. Lamps trimmed with these oils, require either constant use, or being constantly and regularly cleaned; otherwise the oil becomes thick, clogs up the tube which conveys it from the reservoir, and the cotton becomes in like manner clogged, so that all capillary action becomes arrested, and it requires changing nearly every time that it is used, provided it is not constantly burned, and even then it becomes necessary to clear the tube occasionally. For the purpose of ensuring as complete combustion of these cheap oils as it is possible to obtain, many plans have been devised. Those most deserving of attention are, the *Patent Oxydator*, invented by Mr. Young, and the means devised by our correspondent Mr. George Gwilt, at page 56 of the first volume. Of these two contrivances that of Mr. Gwilt is considered preferable to the Patent Oxydator, as in case of the glass being broken it is the more readily obtained and renewed. The expense is much about the same.

As a portable means of illumination for microscopic purposes, and which may be readily carried in the pocket without the slightest inconvenience, is the *Portable Candle Lamp*, first made by Mr. George Jackson; it burns the candles manufactured by Molyneux and Co., which require no snuffing; these lamps may be obtained of Mr. Ross, Optician, Regent Circus, for six or seven shillings.

The light of coal gas answers admirably where it can be conveniently made use of. In those houses where gas is laid on to the sitting-rooms, as to chandeliers, a flexible tube may be readily adjusted to one of the pipes, which will convey the gas to a moveable gas lamp on the table beneath, as first done by Mr. George Lowe.

In cases where neither oil or gas illumination can be obtained, a portion of a wax candle in a low candlestick is to be preferred to a number

of candles placed however close to each other. In the absence of wax, composition, and then mould candles, should be sought for; the great disadvantage, however, of candle illumination, is the unsteadiness of the flame, from draughts and other causes.

*Shades for Argand Lamps.*—When these are made of metal, they become very hot, and radiate so much heat, as in many instances, when a brilliant illumination is required, and the lamp is placed near to the instrument, to produce considerable inconvenience to the observer. To obviate this, Mr. Nasmyth first used a double metal shade, the internal one being about a quarter of an inch less in diameter than the external; by this contrivance a current of cold air is constantly passing between the two, and keeps the outer one cool. These shades are best made with a double chimney, so as to encircle the lamp glass and to pass rather above it. This is a great addition to the ordinary shades for lamps.

If it be desired to illuminate the room generally, as well as the instrument, the paper shades answer best, such as are recommended by Mr. Gwilt, and made in the following manner: —

"Take half a sheet of good foolscap paper, and strike thereon two semicircles, as in the diagram, the longest diameter being thirteen inches, and the shorter one four inches, fitting and adapting it to the skeleton sliding frame, as the case may require, and then glueing or pasting the superfluous edges together. When once properly fitted, another pattern may (previously to the glueing of the edges) be traced out and kept at hand, from which any number may at any time be drawn, and a new shade made when wanted, in less than ten minutes. To get rid of the penumbral shadow, lower it down until it becomes almost wholly dissipated. These shades are much less fatiguing to the eye than the contrast occasioned by an opaque body in juxtaposition with a bright light, and they also diffuse a more subdued but useful light around the appartment." — (Vol. I. p. 58.)

*Illumination by Reflection.*—Mr. G. Jackson, to whom microscopists are much indebted for various simple improvements in the construction of the instrument, employs a plano-convex lens of about two inches in diameter, and of four and a half inches focus, silvered on the plane side, and backed with a plate of brass or other metal, to fix a pin in its centre for the purpose of applying it to the microscope. This lens, when so treated, becomes a reflector of about two and a quarter inches

focus, and forms one of the best instruments that can be desired for throwing light upon an object viewed as opaque.

Mr. George Gwilt was the first to use the polished silver concave reflector for viewing opaque objects in the manner in which Mr. James Smith, under Mr. Gwilt's directions, fitted one to his microscope; it is the most simple and effective means yet devised, and the expense but little. Such a mode of illumination is preferable to that of the Lieberkuhn for more reasons than one. The first and very essential is, the not being obliged to cut up objects into pieces, as small or smaller than the *stop*, but the whole wing of a butterfly may be mounted, and every part of it easily seen. By this mode of illumination, also, a greater effect of light and shade can be thrown upon the object, so as to define many objects, such as the markings on the scales of moths, &c.; the disadvantage of the Lieberkuhn being, that the light is thrown too perpendicularly, and this effect is in a measure lost.

*Glass for mounting objects.*—The best glass for mounting objects upon is what is termed the *best flatted crown*, which is sold by the superficial square foot. Messrs. Chater and Haywood of Thames Street always keep a stock, and will accommodate microscopists.

The *very thin glass* is to be obtained of Mr. Drake, Jermyn Street, St. James's, who has for some time turned his attention to the subject, and has manufactured an article the $\frac{1}{100}$th of an inch in thickness, which may be obtained for three shillings and sixpence per ounce. The thicker kind, $\frac{1}{50}$th of an inch, may be had much cheaper.

*Mica*, or Talc (as it was formerly called) is now almost entirely superseded by the introduction of thin glass; it is very readily scratched, and is seldom obtained free from cracks. Those in the habit of mounting objects, never recommend the use of this substance for covering objects, when the thin glass can be obtained.

*Cutting Glass.*—Two kinds of diamonds are used by microscopists for this purpose. For cutting ordinary crown, or plate-glass, the common glazier's diamond is generally employed; but for the very thin glass this instrument is by no means adapted. For this purpose a good writing diamond is requisite, which should be brought to a very fine *scratching* point only. To cut the discs of thin glass for covering objects, strike a circle of the required dimensions on a piece of card-board, and cut it out with a penknife. Place this pattern over the glass, and pass the writing diamond around the edge of the circle, until it has scratched it. A mere scratch is sufficient to enable the operator easily

to remove the surrounding portions. This is said to be Mr. C. M. Topping's plan.

Diamonds of good quality for these purposes may be obtained from Mr. Ellis, Goswell Street Road. The price of a good cutting diamond, for ordinary purposes, is about fourteen shillings, that of a scratching one, a guinea.

The Microscopical Society of London possesses a machine for cutting glass for slides of any desired size, which may be made use of by its members, on application to the Secretary. Mr. Drake of Jermyn Street is also in possession of a similar instrument, and supplies strips of glass to order.

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## XVI.—ON THE DEVELOPMENT OF THE ANIMAL TISSUES.*

*By Professor Müller.*

MODERN Vegetable Physiologists have for some time arrived at the result that the different tissues of plants, such as cellular tissue, woody fibre, ducts, and spiral vessels, are all originally developed from cells. The mode of formation of these cells has been explained by Schleiden.† He has shown that they are produced from the "nuclei" of Robert Brown, and hence he calls these bodies "*cytoblasts*" [κυτος a cell, βλαστὸς a germen]. The cytoblast is generally of a yellowish colour, and internally of a granular structure. In its interior Schleiden has detected a second nucleus (nucleolus), called by him the nucleus corpuscle, which sometimes resembles a mere spot, at other times a hollow globule. The cytoblasts are developed in a mass of mucous granules contained within previously existing cells. As soon as they have attained their full size, a delicate transparent vesicle rises upon the surface of each. This is the young cell, which at first bears the same relation to the flat nucleus as the watch-glass bears to a watch. When the cell has increased in size, the cytoblast appears merely as a solid body included in the wall of the cell. The layer which now covers the cytoblast on the side towards the interior of the cell is extremely delicate—indeed, seldom to be recognized by the eye—and it soon becomes wholly absorbed, while the cytoblast itself disappears at the same time. The newly developed cells lie free in the cavity of the parent cell, and, as they grow and exert reciprocal pressure against each other, assume the polyhedral form.

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* From Müller's Elements of Physiology, translated by Dr. Baly, p. 1641.

† Müller's Archives, 1838, p. 137.

The following are the more important discoveries of Schwann,* respecting the cells of animals, and the agreement of animals and plants in their ultimate structure.

In the chorda dorsalis, the cellular structure of which I had myself pointed out long since, Schwann first discovered the nuclei or cytoblasts. Each cell of the chorda dorsalis of *Pelobates fuscus* has its disc-like cytoblast lying at the inner surface of the wall of the cell; and in this nucleus there is seen one, rarely two or three, clearly defined spots. In the cavity of the cells young cells are developed, as in plants.

Cartilages also are, according to Schwann's observations, composed entirely of cells, when first formed. The cartilaginous branchial rays of fishes at their apex are composed of small polyhedral cells, lying in close contact with each other, and having very thin walls. These cells have rounded granular nuclei. Towards the middle of the branchial ray, the septa between the cavities of the different cells formed by their walls, gradually become thicker. Nearer to the root or base of the branchial ray, the walls of the contiguous cells can no longer be distinguished from each other, and the mass appears to be formed of a homogeneous substance containing small cavities; but around some of the cavities a circular line can be distinguished, which indicates the boundary of the wall of the cell, and proves that the whole mass is not formed by the thickened walls of the cells, but that a real intercellular substance also exists. Even while the walls of the cells are still in contact with each other this intercellular substance is present, at that time appearing here and there like a triangular space between three contiguous cells. In this form of cartilage the process of development consists partly in the thickening of the walls of the cells, and partly in the production of an intercellular substance. In higher vertebrate animals the thickening of the walls of the cells is not observed, and the principal mass of the future cartilage appears to be formed by the intercellular substance, in which the cells, with the younger cells within them, are included. The development of cells in the manner of the cells of plants, has been observed by Schwann in the branchial cartilages of *Pelobates fuscus*, in which some cells contain mere nuclei; others, nuclei with small cells developed upon them, and scarcely larger than themselves; others, again, larger fully formed cells. So that here all

* Froriep's Notizen, 1838, Nos. 91, 102, 112. Schwann Microscopische Untersuchungen über die Ueber-einstimmung in der Structur und dem Wachsthum der Thiere und Pflanzen, Berlin, 1838. [A review of this work, with a copious abstract of its contents, is contained in the 9th volume of the British and Foreign Medical Review.]

the stages of the development of a cell are present. The process of the development of cartilage seems to be independent of blood-vessels, and to be wholly analogous to the process of growth in vegetable tissues: how the canals radiating from the corpuscles of ossified bone are developed is not known. Two hypotheses are proposed by Schwann. If the osseous corpuscles are the cavities of cells, the thickened walls of which have coalesced with each other and with the intercellular substance, so as to form the mass of the cartilage of the bone, then the radiating canaliculi may be regarded as canals extending from the cavities of the cells through their thickened walls, and would be analogous to the pore-like canals of some vegetable cells. But if the osseous corpuscles are the cells themselves, and not merely their cavities, the whole substance between the corpuscles being intercellular substance; in this case the canaliculi will probably be radiating prolongations of the cells extending into the intercellular substance. According to the latter view, which Schwann regards as the more probable, the canaliculi would correspond to the processes given off from some cells of plants.

Besides the formation of young cells in the cavities of previously existing cells, Schwann has observed their development in the exterior of other cells in a structureless substance, the *cytoblastema*. In this case, also, the nucleus generally appears to be first formed, and the cell to be afterwards developed around it. In many animal tissues, the new cells are formed on the exterior of the earlier cells. In the one case the cytoblastema exists in the interior of the cells already existing; in the other it is external to them.

Schwann arranges the tissues of the animal organism, according to the mode of their development, in five classes:—

I. Isolated independent cells, which either float free in a fluid, or if deposited, in contact with each other, are still unconnected and moveable.

II. Independent cells, arranged so as to form a continuous membrane.

III. Tissues formed of cells, the walls of which have coalesced, while their cavities remain distinct.

IV. Fibre cells.—Cells which have become elongated in different directions, and resolved into bundles of fibres.

V. Cells, both the walls and the cavities of which have coalesced, so as to form tubes.

To the *first class* belong the corpuscles of the blood. The vesicular nature of these bodies was observed by C. H. Schultz. Their nucleus,

as Schwann remarks, remains attached to the inner surface of their membranous parietes, when they are rendered turgid by the action of water. The red colouring matter of the corpuscles is to be regarded as the contents of the cells. The lymph corpuscles, the globules of mucus, and those of pus, belong to the same class. They are all nucleated cells.

To the *second class* belong the horny tissues, the pigment membranes, and the tissue of the crystalline lens.

1. *Epithelium*.—Generally composed of round cells, to the inner surface of whose parietes a nucleus containing one or two nuclei is attached. When united into a membrane, they are polyhedral. In the epithelium of the skin of a frog, Schwann saw two nuclei in one cell, and also a nucleated epithelium cell within another larger cell; a fact which Henle has not observed in Mammalia. The epithelium cells, at first globular, undergo modifications of form in one or two directions. Either they acquire the form of perpendicular cylinders, as in the epithelium of the intestinal mucous membrane, described by Henle; or they become flattened into laminæ, which have the nucleus in the middle of one surface, and which sometimes are elongated or riband-shaped, as in the epithelium of blood-vessels according to Henle. In the latter case, it is observed, that the young cells are found beneath the older ones, and are at first globular, but become more and more flattened as they approach the free surface of the epithelium.

2. *Pigment cells*.—These have a nucleus at one part of their parietes, which produces the well-known white spot in the middle of some pigment cells. The nucleus has usually one or two nucleoli. Many pigment cells in the progress of their growth, send out hollow fibre-like processes in different directions, so as to become stellate cells.

3. *Nails*.—The nail of a fully developed human fœtus consists of laminæ lying horizontally one upon the other. These laminæ become less and less distinct at the inferior surface of the nail, in proportion as the part examined is nearer to the root of the nail which is inserted into the fold of the skin of the finger; and the posterior half of this portion of the nail presents nothing of a laminated structure, but consists merely of polyhedral cells, with distinct nuclei. Laminæ of the nail treated with acetic acid, separate into scales, in which an indistinct nucleus can in very rare cases be observed. The polyhedral cells of the root of the nail must become flattened into these scales, and the nail ought consequently to become thinner towards its free margin. This is probably prevented by the formation of laminæ of epithelium,

at the under surface of the nail. The horny tissue of the hoofs of animals, also consists in the fœtus entirely of cells.

4. *Feathers.*—The medullary substance of feathers is composed of polyhedral cells. In the young feather, a nucleus is visible in the wall of each of these cells. The cells are developed around small nuclei, which lie in great number in a finely granular matter. This formation of new cells takes place, not in old parent cells, but near the surface of the vascular matrix of the feather, which affords the cytoblastema. Some of the nuclei contain nucleoli. The fibres of the cortical part of the shaft of the feather are produced from large band-like epithelium cells, which contain nuclei and nucleoli. These cells become resolved into several fibres, while all trace of the cell disappears. The barbs of the feathers are themselves miniature feathers; the secondary shafts have the same structure as the main shaft, while the secondary barbs or barbules in their turn consist at first of nucleated cells applied to each other by their edges.

5. *The Crystalline lens.*—The fibres of the crystalline lens are developed from the cells first observed by Werneck. In the lens of a chick after eight days' incubation there are as yet no fibres, but merely pale round cells, some of which contain a nucleus. In lenses further developed, some of the larger cells contain one or two smaller cells in their interior. In embryo pigs, measuring three and a half inches in length, the greater part of the fibres of the lens is already perfect; but a part is still not completely formed; and there are besides many round cells which are about to undergo their metamorphosis. The perfect fibres compose a nucleus in the centre of the lens. The next fibres are seen to be tabular prolongations of globular cells. The dentated orders of these cells, like those of some vegetable cells, are formed subsequently.

(*To be continued.*)

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## Extracts and Abstracts from Foreign Journals.

[From *Valentin's Repertorium*, 1841.]

*Decaisne on the Structural development of the Generative System of Viscum album.*—The male flowers may be detected almost a year before anthesis. At first the anthers are only distinguishable from the adjacent green periantheal expansions by their want of colour, they being otherwise composed of the same kind of cells. At a later period numerous spaces, filled with a mucous fluid, are seen, from which mucus other cells, larger than the adjacent ones, and kept together by a transparent

substance, are formed; these latter cells represent the mother-cells in which the pollen is generated. Besides these the antheroid mass has at this time two descriptions of cells; on one side the primordial colourless cells; on the other, grey or yellow cells, generally provided with a nucleus. The mother-cells soon become dark, as they fill with numerous granules, in which one or two granular nuclei appear. These granules coalesce in the centre of the cell, so that a transparent space is left around them; they then disappear, leaving the nuclei in the centre. These nuclei are separated from each other at first by a fluid, which afterwards becomes firm, forming distinct walls between them, during this time also the walls of the mother-cells have been getting thicker; the nuclei continue to increase in size, become of a spherical form, and are surrounded with a yellowish mamellated case; as the walls of the mother cells and the separating membranes disappear, they become free, and produce perfect granules of pollen. No spiral cells or fibrous structure are developed in the endothecium. In the female flower, three months after impregnation, the nucleus first appears as a very small conical body, lying at the bottom of the ovarial cavity, accompanied by one or two small club-shaped filaments, which are abortive nuclei. The nucleus grows very rapidly, and has at its point a small spot indicating the embryo, which is developed like the embryo of other dicotyledons, there being, however, no quintine or embryo-sac. The only covering is the remains of the nucleus or nuclear-sac, which increases in size, becomes firmer, and forms a green-coloured perisperm.

*Mohl on the Structure of the Stem of Isoetes lacustris.*—Whilst the upper flattened leaf-covered surface of the spheroidal or bulb-like stem presents nothing peculiar in appearance, the under one is seen to be traversed by a furrow or slit, which extends to both sides, and as high up as the insertion of the leaves; so that the stem consists of two spherical or bulb-like masses, connected by a commissure. The radicles which are found in this furrow are not developed like those of other abbreviated stems (bulbs, premorse roots, stems of other cryptogamia and monocotyledons) in regular succession, so that the radicles seated on the lowest portion are the oldest, but the new ones break through the whole length of the furrow in its deepest part, they are therefore placed in a semilunar manner, the points of the figure which they represent pointing to the insertion of the leaves. Probably every year the stem loses an external coat, whilst a new layer is formed in the centre. From the very minute woody system of the stem, a great quantity of delicate unbranched and non-anastomosing vascular bundles are found radiating. From the upper ones there proceeds an arched bundle, both to the upper and under surface of each leaf; from the lower there passes a bundle to each radicular filament. The whole white mass of the spherical stem consists of parenchymatous cells arranged in rows parallel with the vascular bundles, filled with amylum, and between which run large intercellular passages. The external cells lie more parallel with the surface of the sphere, contain very little, or even no amylum, and form a peculiar, though not very distinctly defined layer,

from which the barky covering of the radicles is formed. This layer fills the base of the deep indenting furrow. In the cells of the dead layer, the amylum disappears, and a brown colour is produced. The small central woody system is composed of short, roundish, spiral, and annular cells with larger intercellular spaces and passages, amongst which only a few plain cells, having thin walls, are distributed. The radiating vascular bundles consist of delicate annular and spiral vessels, and a few elongated cells having delicate walls; at the junction of them with the woody system, the vessels become shortly articulated.

*On Entozoa and Parasites.*—(Reference to the following, p. 239, et seq. Valentin's Repertorium, 1841.) *Nivet* on Cysticerci. *Häring* on a case of Cysticercus cellulosa in the conjunctiva of a girl seven years of age. *Michéa* on two cases of Acephalocysts in the brain. *Cruiveilhier* on Acephalocysts of the liver, and especially of the spleen. *Weitenkampf* on the passage of *Blasenschwänzen* (?) with the urine. *Wymann* on Filaria in the bronchi of a sheep. *Lee* on Filaria papillosa in the anterior chamber of the eye of the horse. *Müller* on Distoma in the hollow of the spinal marrow of the Fœtus. *Mæsson* on a worm found in the bubo of a woman thirty-six years of age. *Skripitzin* on Pulex penetrans. *Brunzlow* on the Acarus of the Itch.

*Will on the Compound Eyes of Insects and Crustacea. (Continued from page* 185, *Vol. I.*)—Behind the cornea is a layer of minute conical or pyramidal-shaped crystalline bodies, one of which is placed behind each corneal facet, in such a direction that its acuminated extremity points to the interior of the eye. Connected with this extremity is a nervous fibril given off by the optic ganglia, which spreads itself out in a cup-shaped manner, surrounds the whole of the crystalline body, with the exception of its base, and then either immediately passes to the edges of the facets of the cornea, or to a thin membrane between the crystalline bodies and the cornea. A great deal of pigment is found between the crystalline bodies, especially near their points. No trachea could be discovered in the layer of pigment. Amongst the *Crustacea, Palæmon serratus* has four-cornered facets and crystalline bodies. The latter, when pressed, divide longitudinally into four portions, the places of separation being indicated in the perfect bodies by the presence of longitudinal lines. Between the cornea and the convex bases of the crystalline bodies, is a transparent layer, provided with pigment, and of the thickness of $\frac{1}{100}$th to $\frac{1}{90}$th of a line. This layer can easily be separated from the bodies just alluded to, and behind which latter is a soft cylindrical mass of about half their length, which envelopes their posterior quarter in a cup-like manner. The whole mass is very thickly studded with dark pigment. To each crystalline body runs a cylindrical cord, given off by the ganglia of the optic nerves, and which consists of a tube enveloped in a sheath to the point where this cord separates from the ganglion; the sheath is constricted and surrounded with a great quantity of pigment. From the transparent masses behind the crystalline bodies, a bason-shaped expansion arises, which reaches anteri-

orly to the facets. *Galathea strigosa*, *Astacus fluviatilis*, and *Astacus marinus*, shew the same structure. In *Galathea*, the substance between the cornea and crystalline bodies is thinner, and the masses appended to the posterior portions of the latter are shorter than ordinary. In *Astacus fluviatilis*, a delicate margin exists around the crystalline bodies, and no tube could be discovered within the nervous cord. In *Astacus marinus*, the transparent masses behind the bodies are very long; whilst in *Pasiphæa squinado* and *Palinurus locusta*, none could be found. In *Squilla mantis*, the nervous fibril has a brown coloured sheath, and is dilated anteriorly. In all the *Coleoptera* which were examined, as in *Melolontha vulgaris*, *M. fullo*, *Dytiscus marginalis*, *Staphylinus erythropterus*, *Calosoma sycophanta*, and *Cetonia aurata*, the crystalline bodies are conical, and appear, with the exception of *Cetonia aurata*, to lie immediately upon the cornea. The transparent masses behind these bodies are also wanting. By gentle pressure, the crystalline cones split into an indefinite number of prisms, and have a narrow margin, which is probably caused by the presence of an envelope or case. In *Melolontha vulgaris*, *Cetonia aurata*, and *Calosoma sycophanta*, at the points, a small granule was seen, which probably belongs to the optic nerves. The nervous fibril is thicker (in *Cetonia aurata*, three or four times thicker) at the place where it is given off by the ganglia than the rest of the nervous cord; and in this species the bason-shaped expansion before alluded to, reaches to the facets, and the cones are surrounded with much pigment. In the *Orthoptora* the crystalline bodies are also conical, and the optic nerve has a dark tube in the centre. The pigment, like in the *Coleoptera*, leaves round openings in the cornea, free of any. In *Gryllotalpa*, the crystalline bodies imbedded in the dark-brown pigment are very small; and in *Locusta viridissima*, their basal surfaces have an hexagonal-form, with blunt points, and the nervous fibril has a clear tube within it. *Mantis religiosa* has very long hexangular crystalline bodies immediately beneath the cornea and very closely packed together, their points alone being provided with pigment; the bason-shaped expansion of the nervous fibril, which latter possesses a sheath and clear tube, is green. In the *Hymenoptera*, *Vespa crabro* has a thin transparant membrane next the cornea, which has divisions equal in number to the facets of the cornea, and which keeps the crystalline bodies connected together when separated from this latter covering. The bases of these conical bodies are placed in hexagonal divisions of bright yellow pigment. The comparatively very thick but uniformly cylindrical nervous fibril has everywhere dark pigment, and is provided with a delicate and clear tube; the latter, with the pigment belonging to it, ceases at the point of the cone. The inner tube surrounds the cone in a bason-like manner. *Apis mellifica* has also short conical bodies, with slightly convex bases enveloped in dark red pigment; its nervous fibre is similar to that of *Vespa*. *Bombus* is the same.

*(To be continued.)*

[From *Müller's Archives*, 1841.]

*Valentin on an Entozoon in the Blood of Salmo fario.* — In the blood obtained from the commencement of the abdominal aorta, in a specimen of *Salmo fario*, some dark globules, similar to the round cells of pigment were observed amongst the proper blood-globules. They moved actively, generally tremulously, but yet were distinctly locomotive. After regarding them some time, a transparent tail was observed laterally. Gradually an animal, elongated in form, disenveloped itself, which moved about actively and constantly. Its motion was produced by means of from one to three variable and semi-lateral apendages, by which it rolled in a circular direction. The anterior and posterior portions of the creature were bright and transparent, the medial contained numerous dark granules, probably molecules of pigment derived from the material it had eaten. When the creature was rolled up, it appeared as if these molecules were enveloped in a sort of case derived from the body, which was transparent, and at length club-shaped. Fig. *a*, (Pl. III. Div. 4.) represents the primary globule seen ; Figs. *b*, *c*, *d*, various conditions of the globule, showing the tail unrolling; *e*, a globule, in which the molecules appear as if enclosed in special portions of the body, which become club-shaped ; *f*, this club-shaped receptacle ideally represented ; *g* to *m*, different forms of fully developed animals, and which no doubt belong to the old genus Proteus, or the new genus Amœba of Ehrenberg. It is probably a new species, as it does not agree with any already described and drawn by the last-mentioned author. Of its internal and delicate organization, nothing with certainty could be made out, as it only measured from 0.0003 to 0.0005 parts of an inch long.

Sometimes it appeared to have a round aperture anteriorly, and the tail striated, as is represented at *k*. The variable appendages or projections always appeared under the microscope, to be as they are drawn, on the right side. Perhaps the club-shaped receptacles before alluded to, were of the same or similar proportions. It was at first a matter of doubt whether this creature really belonged to the blood, and the whole fish was therefore examined ; but no where else could it be detected ; not a trace of this Infusorial Entozoon could elsewhere be found, save in the favourite place of microscopic intestinal worms, the fourth ventricle, in which was discovered a single specimen. On the other hand, they were so plentiful in the blood, that a single drop always contained one, often ten, and sometimes more. In the effused blood they remained alive between 16 and 18 hours. This fluid itself presented otherwise nothing abnormal, and which fact deserves to be borne in mind. Ascaris obtuso-candata zeder was found in abundance in this Salmo, but no other intestinal worm.—*Heft.* 5, 1841.

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[From the *Annales des Sciences Naturelles*, 1841.]

*Desmazierès on Microthyrium Microscopicum.*—This minute and very curious production (Lichen) grows on the upper surface of dry and half

decomposed leaves of the Chesnut. M. Roberge, to whom I am indebted for a sufficient number of specimens to illustrate my work on Cryptogamia, observed it also on the leaves of the oak. It is scattered or arranged in groups, and at those parts where several meet together, they appear of a greyish-brown colour, while the rest of the leaf is of a reddish tint. On these irregular and more or less extensive patches, a lens brings into view small discs or perithecia, depressed in the centre, where a small elevation is to be observed. These discs, of which the diameter scarcely attains $\frac{1}{7}$th of a millimetre, are blackish, slightly shining, of a leaden hue, especially around the papilla, or elevation. They are readily and easily detached entire from their support, and, submitted to the microscope, they are found to be composed of a very delicate semi-diaphanous membrane, furnished with a network of opaque fibrillæ, radiating from the centre to the circumference, and traversed by other fibrillæ, crossing them exactly similar to the delicate tissue in the spider's web; in the centre is also found an opening, which corresponds to the elevation above alluded to. Beneath this small membraniform disc the thecæ are found, which are fixed, concealed, and circularly arranged, their base corresponding to the opening of the disc. These thecæ, devoid of paraphysa, are in a mass, and sometimes in a slight degree swollen towards the middle of their length, which does not exceed the $\frac{1}{20}$th of a millimetre. The enclosed sporidia are oblong, slightly fusiform, straight or a little curved, about $\frac{1}{80}$th of a millimetre in length, and furnished with three sufficiently distinct divisions.

The characters of this new genus and species, as given by Desmazierès, are:—

Microthyrium. Desm. Perithecium simplex, superficiale, membranaceum, adpressum, scutiforme, centro perforatum, obtegens ascos fixos subclavatos.

*M. microscopicum*. Desm. Pl. Crypt. édit. 1, No. 1092; édit. 2, No. 492.—M. epiphyllum; maculis magnis, irregularibus, fusco-cinerascentibus; peritheciis sparsis, minutissimis, tenuissimis, nigris, subnitidis, papillatis; ascis clavatis; sporidiis septatis, oblongis, subfusiformibus.

*Habitat*.—In foliis exsiccatis Fagi, Castaneæ et Quercus. Autumno. —*March, p.* 138.

*Explanation of the Figures.*

Plate III, Div. 2, Fig. 1. *a*, Membraneous Perithecium of *Microthyrium microscopicum*, seen with a power of 260 diameters. *b*, Vertical Section. *c*, Thecæ, concealed and arranged in a circular manner beneath the perithecium. *d*, Oblong fusiform sporidia, usually furnished with three rather distinct divisions.

*Desmazierès on the differential characters of Sphæria insidiosa and S. caulium*.—These two Lichens are so nearly allied in external characters, as to render it almost impossible to decide upon each species without the aid of microscopic investigation. The differences detailed by Desmazierès are the following:—The membrane of the theca of our *Sphæria insidiosa* is so thin and transparent, that no idea would be entertained of its existence, were it not for the sporidia it contains. These spori-

dia, of an olive colour, are oblong, above $\frac{1}{50}$th of a millimetre, slightly curved, and provided with from 3 to 5 partitions, obtuse at their extremities, where a filiform, transparent, short and sharp appendage may be seen.—The theca of *Sphæria caulium*, on the contrary, is longer and very apparent; its sporidia, of a pale greenish colour, measure $\frac{1}{25}$th of a millimetre; they are slightly curved, provided with from 5 to 7 partitions, and pointed at the extremities, to which no appendage is attached.—*March, p.* 145.

*Explanation of the Figures.*

PLATE III. Div. 3. *a*, Thecæ and sporidia of *Sphæria caulium* magnified 500 times. *b*, Thecæ and sporidia of *S. insidiosa*, magnified likewise 500 times.

*Montagne on the use of the Compressor in the examination of Lichens.*—As an essential desideratum to a good achromatic microscope, I will mention the instrument called *Compressorium*, brought to perfection by M. Schiek of Berlin. I cannot too strongly recommend its employment to those who are occupied with researches on the structure of certain parts of Cryptogamic plants, and in particular, the thecæ of Lichens. It would be almost impossible, without its assistance, to verify the facts I have recorded.—*March, p.* 147.

*Dufour on Anatomical and Physiological studies of a species of Musca, with the view of illustrating the History of Metamorphoses, and the Pretended Circulation of Insects.*—This paper is one of some length; but the author, from his dissections, experiments, and reasonings, concludes, that the existence of an aëriferous vascular system adapted to convey the physiological benefits of respiration to all the organs and tissues, is incompatible with the presence of a circulating humour. He is satisfied that the latter does not exist in insects provided with tracheæ, and that the organ which has been supposed to perform this function, is merely rudimentary, bearing some resemblance to the heart of the Arachnides; in fact, an obsolete heart, an organ deprived of every well-determined physiological attribute, and perhaps a mere elementary tissue.—*July*, 1841, *p.* 5.

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[From the *Comptes Rendus*, 1841.]

*Biot on Achromatic Lenses with multiple Glasses in the Eye-piece.*—This communication, which is here only given in abstract, relates especially to Telescopes, and is only quoted in this place, as a reference for opticians, and those interested in instruments used for astronomical purposes.—*6th Dec.* 1841, *p.* 1039.

*Joly on Isaura cycladoïdes.*—The author at the termination of his Memoir arrives at the following results:—1, The *Isaura cycladoïdes* constitutes a new genus of the *Crustacea Branchiopoda*, near to *Apus*, *Limnadus*, and *Cyzicus* of M. Audouin;—2, In form, structure, and mode

of growth of its shell, this genus constitutes a natural connecting link of the *Crustacea* with the *Acephalous Mollusca;* in the rest of its structure, it is related to the *Cirrhipeda*, which come after the *Crustacea.*—3, The *Isaura cycladoïdes* does not acquire its bivalve shell or definitive form until after a series of changes, during which it assumes successively the form of *Artemia, Branchipus*, and still more *Apus* in a young state; then, that of *Daphnia, Lyncia, Cypris, Limnadus*, and *Cyzicus* arrived at the adult state;—4, Although this Branchiopod undergoes very frequent changes, its shell, far from being caducous, as that of all other Crustaceans with a bivalve shell, remains during the entire life of the animal, and resembles also in this particular the coverings of the Mollusca;—5, It enlarges in the same manner as the nacreous portion of the shell of the Malacozoaires, viz., by the addition of successive larger, and more internal layers, the thickened margins of which form at its external surface true striated marks of growth;—6, These layers may be readily separated from each other after a period of 24 hours' maceration in caustic potass;—7, The *Isaura cycladoïdes* is provided with separate sexes. The male is at once distinguished from the female by the presence of two pairs of appendages, situated in front of the abdominal feet, and furnished at their free extremities with a kind of three-fingered apparatus (*griffes*), especially adapted to retain the female during copulation;—8, This animal habitually swims on the abdomen, that is to say, the reverse of other Branchiopodous Crustaceans, and particularly *Apus* and *Limnadus*, to both of which it is nearly allied;—9, Its eggs, similar to those of *Apus, Limnadus*, and *Branchipus*, appear to possess the power of supporting desiccation for a long period, without in the mean time losing the power of germination.—*6th Dec.* 1841, *p.* 1068.

*Brogniart* presented to the Academy, in the name of the author, *M. H. R. Göppert*, a Memoir on the Anatomical Structure of *Coniferæ.* —*6th Dec.* 1841, *p.* 1071.

*Great Prize in Physical Sciences*—Proposed in the year 1837 for 1839, and submitted again for 1843. The Academy proposed as the subject of the Great Prize in Physical Sciences, *at the Public Sitting in* 1839, the following question:—

"Determine, by precise experiment, what is the succession of chemical, physical, and organic changes which take place in the egg during the development of the fœtus in Birds and Batrachians.

"The candidates are required to render an account of the relations of the egg with the natural *milieu ambiant;* and to examine, by direct experiment, the influence of artificial changes on the temperature and chemical composition of this *milieu.*"

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"Within the last few years, several observers have directed attention to, and produced some profound researches on the development of the chick in the egg; and have extended their inquiries to the development of the fœtus in other oviparous animals. Generally speaking, their examinations have principally been conducted in an anatomical

point of view. Some, however, have considered the numerous chemical questions full of interest which this examination is capable of resolving.

"Thus, supposing the chemical analysis of the egg be made at the moment when it is laid, with a view to examine the elements which it absorbs from the air, or evolves during the period of its development—when the losses and absorptions of water which it sustains have been determined, and when the whole of the necessary elements have been reunited—required the consideration of the chemical processes employed by nature for the conversion of the materials of the egg into the very different products composing the young animal.

"In applying to the consideration of this question the actual method of organic analysis, the degree of precision which they have arrived at must be given.

"But, if it be possible, it is desirable to confirm, by ordinary chemical means, the accounts given of the changes which take place in the proportions of carbon, hydrogen, oxygen, and azote; and of those relating to the changes of the mineral products which enter into the composition of the egg; and further, on the other hand, to examine alterations not less important, and capable only of being brought to light by the assistance of the microscope.

"The Academy desire that, far from *endeavouring to confirm*, in the several parts of the egg, the presence of the immediate principles which analysis furnishes, the authors should direct all their efforts, with the assistance of the microscope, to the state in which these immediate principles are there met with.

"Results of a most interesting and important character are anticipated from this chemical and microscopical examination of the phenomena of the production or development of organs.

"Independent of the study of the development of the fœtus in these normal conditions, it is requisite to record the changes that the modifications of temperature, or the nature of the medium in which this development is effected produce. The candidates are further required to investigate the incubation of the eggs of birds in several gases; and in the case of Batrachians, their development in water more or less impregnated with salts, and more or less aërated.

"The prize awarded will be a gold medal of the value of *Three Thousand Francs*. The memoirs must be forwarded to the Secretary of the Academy before the first of April, 1843. It is requisite for the authors to write their names in a sealed packet, which will not be opened until the Prize Memoir is decided upon."—28*th Dec.* 1841, *p.* 1181.

*Coste on Fresh-water Polypi.*—The researches of the author on these animals are of the greatest importance; inasmuch as, after having entered upon the complicated organization of the various species of *Polypi*, the general binary disposition of their organs, the position of their nervous system, and after considering, also, that they have mouths, in many respects analogous to those of the *Mollusca*, and that, like them, they produce the envelope which protects them; and when

to these are added certain special facts which the *Cristatella* present, as, for example, having a foot which is everywhere contractile, and their secreting, like the *Gasteropoda*, a copious viscid matter; we shall be led not only to associate them with the class of the *Mollusca*, but likewise to introduce along with them all the animals which are farther down in the scale. Before, however, maintaining this as an irrefragably established fact, we shall request another opportunity of explaining some additional results.

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[From *Annals of Natural History*, April 1842.]

*Mr. Ralfs on four new Species of Desmidium.*—Mr. Ralfs observes that this natural genus is not well defined, either in Agardh's Conspectus criticus Diatomacearum, or in any of our British works. Its best distinctive characters seem to consist in the crenated appearance of its filaments, which is least evident in D. mucosum. These filaments, which are generally twisted in a regular manner, are of a pale green colour, simple, fragile, short and straight. The species are found during a great part of the year, in clear shallow pools, or in old peat bogs; the filaments being scattered in loose bundles in the water, or forming a thin gelatinous fleece at the bottom of the pool. The species ascertained by Mr. Ralfs are named by him D. cylindricum, mucosum, Swartzii, and Borreri. *(Report of Botanical Society of Edinburgh.)*

[However indefinitely characterised may be this Genus in Agardh and our British works, we think it perfectly satisfactorily determined in the great work of Ehrenberg, in which it will also be seen that Desmidium Swartzii was determined forty years ago, and that D. cylindricum, first observed by Greville in 1827, more properly belongs to the genus Arthrodesmus.]

*Mr. Yarrell on Mucor observed by Col. Montagu growing in the Air Cells of a Bird.*—In addition to the instances quoted in the 8th volume of the Annals, page 229, of the growth of cryptogamous plants in the bronchial tube of a Flamingo, and on the internal surface of the air cells of an Eider duck, Mr. Yarrell refers to another example mentioned by Col. Montagu, who says, "The cause of death appeared to be in the lungs and in the membrane that separates them from the other viscera; this last was much thickened, and all the cavity within was covered with mucor or blue mould. It is a most curious circumstance to find this vegetable production growing within a living animal, and shows that where air is pervious, mould will be found to obtain, if it meets with sufficient moisture and a place congenial to vegetation. Now the fact is that the part on which this vegetable was growing was decayed, and had no longer in itself a living principle; the dead part, therefore, became the proper pabulum of the invisible seeds of the mucor transmitted by the air in respiration. It would indeed be impossible for such to vegetate in a living body, being incompatible with vitality, and we may be assured that decay must take place before the minute vegetable can make a lodgement to aid in the great change of decomposition."

*Buckland on Fossil Remains of Minute Organisms.*—Mr. Tennant has informed me, that a microscopic examination of the Stonesfield slate by Mr. Darker, and of other oolites, has recently shown them to be crowded with remains of organized bodies, invisible to the naked eye. I learn also from Mr. Tennant, that abundant microscopic organic remains have recently been discovered in thin slices of certain beds of carboniferous limestone from Derbyshire: similar results may shortly be expected from a microscopic examination of the chert of the same formation. We must not, however, be tempted by these discoveries to rush suddenly to the rash and unwarranted conclusion, that all limestone and all silex is of organic origin. It has not yet been shown, that the granules resembling the roe of fishes, which give character to the oolitic formation, and abound occasionally in limestone of the triopic carboniferous and Silurian series, have any necessary connexion with organic bodies. We may, with Ehrenberg, admit and admire the extent of microscopic chambered cells and Infusoria which he has shown so largely to pervade the chalk and other calcareous and silicious formations, without claiming an exclusively animal origin for the native substance of all rocks in which lime or silex is the principal ingredient.—*(From Dr. Buckland's Address to the Geological Society.)*

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## PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

*March 16th,* 1841.—*Professor Lindley in the Chair.*

Mr. Edwin J. Quekett made some observations upon a peculiar woody tissue which he had detected in a specimen of Coal. The method adopted in the present instance to discover the structure, was by taking from the specimen, which exhibited a surface like charcoal on one of its sides, some minute scrapings, by the aid of a sharp knife, and immersing them in Canada Balsam. By this means the woody fibres became more or less separated, and certain of these fibres then appeared as if containing some resinous matter, which had preserved their original character, appearing perfect as in recent wood. The structure of the woody fibres was evidently that of the coniferous character; where there are more than one row of dots on each fibre, these dots appeared to be formed by two spirals wound in the interior in different directions, the turns of each connected at intervals by longitudinal bands, thereby leaving a transparent space by such arrangement.

Mr. Quekett also exhibited a silicified specimen of coniferous wood (said to be from Greenland), which presented the like structure. Nothing analogous, he believed, had hitherto been detected in recent woods.

Mr. Busk exhibited some parasitic insects which he had received from South America: they were sent to him in a letter, and were still alive. They are said to be highly injurious to horned cattle, not only producing destructive skin diseases, but often occasioning caries and necrosis of the bones, by their burrowing into the joints.

PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

*December* 2, 1841.—*Mr. Bergin in the Chair.*

The Secretary having read the minutes of the former meeting, various matters of private business were brought before the Society.

Mr. Allman presented specimens of *Trichina spiralis*, a rare and remarkable Entozoon found in human muscle: the muscle was a portion of the Pectoralis major of a man who had died of fever. Mr. Bergin mentioned a statement made by Mr. J. Quekett, that Porpoises taken in estuaries and rivers abound in parasites, and supposed that they might have been driven to the shallows in order to get rid of them; a few days since, however, he had procured a porpoise, captured in the open bay of Dublin, and found its bronchial tubes filled with specimens of Strongylus.*

*January* 6, 1842.—*T. F. Bergin, Esq., in the Chair.*

After the transaction of private business, Mr. Mackay laid before the Society a specimen of *Equisetum elongatum* new to the British Flora:—discovered in Colin-Glen, near Belfast, by Mr. Whitlaw, and figured by Schlechtendahl from the Cape of Good Hope.

Mr. Yeates presented to the Society a Microscope Case, containing several instruments necessary in microscopic investigations.

Mr. Bergin read some notes on Ehrenberg's late interesting communication to the Berlin Academy, on the important part which microscopic organization plays in the choking up of certain harbours.† (See p. 68.)

Mr. Callwell presented specimens, prepared in balsam, of *Trichina spiralis* separated from the muscle that had contained them.

Mr. Andrews exhibited specimens of *Plumularia cristata* from Kerry County in the west of Ireland.

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## Microscopical Memoranda.

*On the occurrence of Tricocephalus Affinis in the Tonsil of a Man.*—At a post-mortem examination of James Flack, of the 75th Regiment, at the Army General Hospital, Fort Pitt, Chatham, one specimen of this Entozoon was found imbedded on cutting into the left tonsil, which was considerably enlarged and in a gangrenous sloughy condition. This species, first described by Rudolphi, has not, according to this observer, been hitherto discovered in the human subject. On submitting the specimen to examination under the Microscope, it was found to be a female. It is preserved in the Museum of Fort Pitt.—*Editor.*

*Distinguishing character of Algæ and Animalcules.*—The active motions and contractions in plants and their parts, especially in *Algæ*, ought not

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* See Mr. Quekett's remarks, Vol. I, p. 125 of this Journal.

† Ehrenberg's communication will be found in the Microscopic Journal, Vol. I, p.162.

to give rise to the supposition of an animal nature, even when they are called infusorial or animal motions. Internal nutritive organs, and a definite oval aperture for the reception of solid substances, which may be demonstrated, distinguish the apparently most simple animal from plants. Ehrenberg has never seen, in his numerous experiments, the motive Algæ seeds take up the smallest quantity of solid nutriment; and thus the fruit strewing Alga may be distinguished from the *Monades* which swarm round it in the same manner, as the tree from the bird. —*Ehrenberg in Poggendorff's Annalen. Taylor's Scient. Mem. Vol. I. p.* 566.

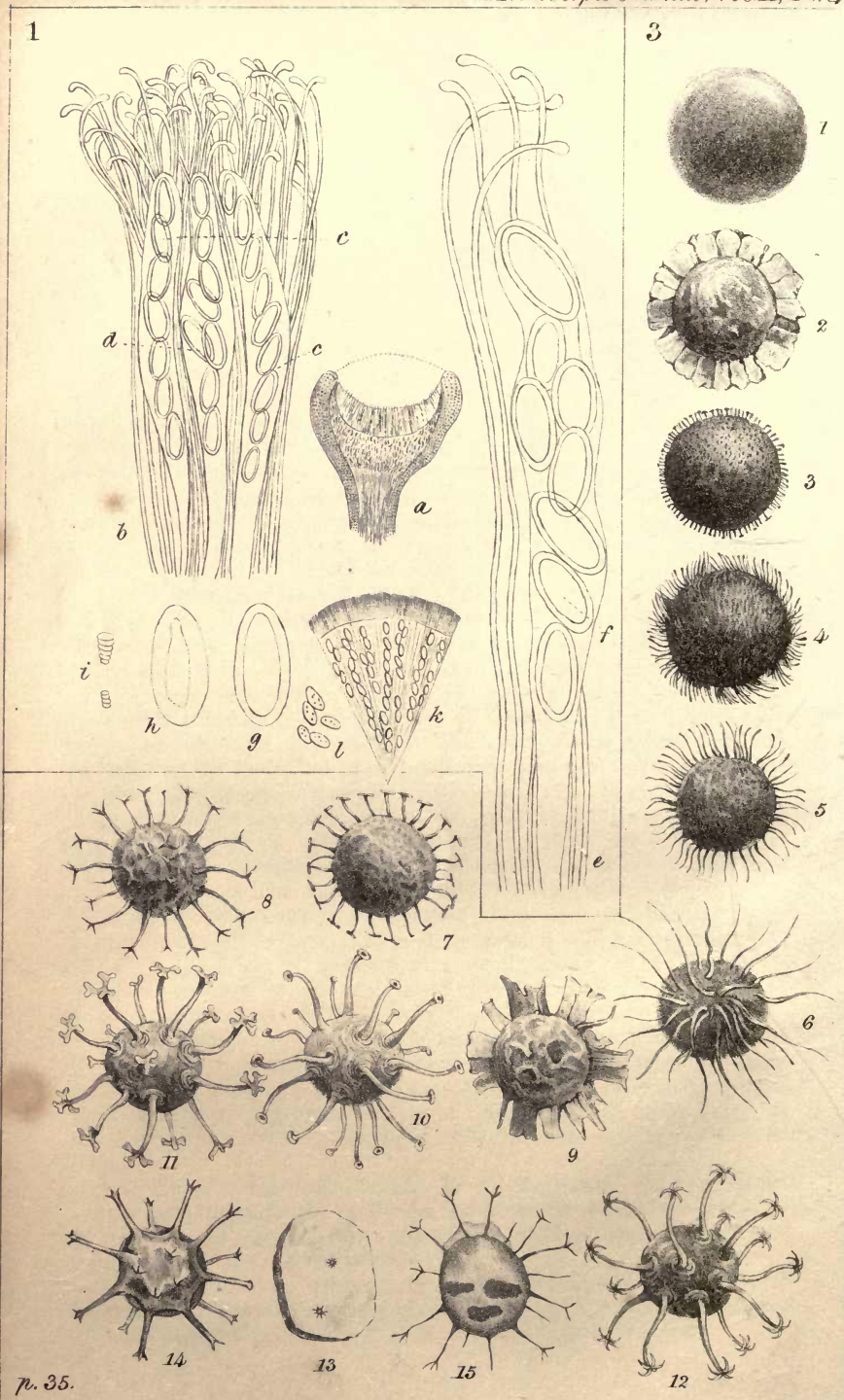
*Gulliver on the Ova of the Distoma Hepaticum.*—The physiology of the common Liver Fluke is extremely interesting, on account of the connection which this parasite has with a very frequent and fatal disease of that useful animal, the sheep. "If we obtain," says Mr. G., "from the bile-ducts of the sheep, some of the larger ova of the Entozoon, and subject them to careful examination, it will be found that the cyst of the ovum presents a very clear outline, the continuity of which is uninterrupted, except at one end, where a well-marked *operculum* may be seen. The size of these ova differs considerably; their average length is about $\frac{1}{250}$th of an inch, and their breadth $\frac{1}{400}$th. The interior of the cyst is occupied by granular matter, often contained within secondary and more delicate cysts or cellules, generally of a circular figure, and occasionally having within them a third still smaller cyst. The diameter of the latter is about $\frac{1}{4000}$th of an inch, and of the secondary cysts $\frac{1}{1500}$th of an inch is a common size, although their magnitude is very variable. The granules within the cells or cysts also differ much in size, but they are very commonly about $\frac{1}{8000}$th of an inch in diameter. When the ova of the Distoma are compressed forcibly, the operculum is lifted up or even separated entirely, and the granular matter extruded, with its containing cells or cysts generally broken. The operculum does not appear to exist in the smaller and immature ova. Whether what is commonly called the ovum of the Entozoon, may may not be a cyst containing numerous ova within it, and furnished with an operculum, to allow of their extrusion when mature, and fit for propagation, appears to Mr. G. to be an interesting question. At all events, it should be ascertained if the cysts be discharged with the dung of the diseased sheep, whether the granules have escaped or not; and whether they are to be found in the pasturage of those localities, where the Entozoon is sometimes known to be propagated so quickly as soon to infect entire flocks of sheep. Mr. G. could never see any thing like a small fluke in the outer cyst, at any period of its growth, although the operculum was often observed just ready to open and give exit to its contents, as above described. The granules may possibly be regarded as yolk-globules, in which case Mr. G. apprehends the numerous secondary cysts, or cells, must be considered as so many different yolks."—*Proc. Zool. Soc. Lond., March* 10*th*, 1840.

*Broderip and Brewster on the Structure and Optical Characters of Bulinus velatus, and other Land-Shells, collected by Mr. Cuming.*—In a

great number of the beautiful land-shells of the Philippine Islands, collected by Mr. Cuming, the pattern, upon immersion in water or other fluid, becomes entirely obliterated till evaporation restores the colours to all their pristine brilliancy. In this species, the very reverse is the result of the immersion. The external whitish porous epidermis which veils the shell when dry, suffers the bright colours to shine out when immersed in water. *B. velatus* is described above, as it appears on immersion, and before it becomes dry; but in the latter state the beauties of the shell are shrouded, and the colour of the sutural bands, peeping out between interstices in the epidermis, gives to these bands a moniliform appearance. Mr. Broderip forwarded to Sir D. Brewster, four or five species of those land-shells, from which the pattern disappears upon immersion; but he has not as yet forwarded to him any upon which the colours come out when so treated. The following is an extract from Sir D. Brewster's letter on the subject:—"The disappearance of the white pattern by immersion in water, or any other evaporable fluid, and its subsequent re-appearance when the shell is dry, are phenomena perfectly analogous to those of *hydrophanous opal*, *tabasheer*, and other porous substances. The phenomenon in land-shells is still more beautiful when we examine them by *transmitted* light. The pattern, which is *white* by *reflected* light, is *dark* by *transmitted* light, and *vice versa*. This is particularly beautiful in the *Helix pulcherrima*, where the ground of the *white* pattern is almost *black* by reflected light, and of a light *reddish* colour by transmitted light, the pattern which is *white* by reflection having a *dark red* colour by transmitted light. In all these shells the difference of structure by which the pattern is produced, does not exist in the shell, but in the *epidermis*, and hence the pattern may be wholly obliterated by removing the epidermis. It appears to me, from very careful observations, that the epidermis consists of two layers, and that it is only the upper layer which is porous whenever the pattern is white. These *white* or porous portions of the epidermis differ from the other parts of the upper layer only in having been deprived of, or in never having possessed, the element which gives transparency to the membrane, in the same manner as hydrophanous opal has become *white*, from the expulsion of its water of crystallization. When the shell is immersed in water or any other fluid, the fluid enters the pores of the white epidermis, and having nearly the same refractive power as the epidermis, no light is reflected at the separating surface of the water and the pores which contain it, so that the light passes through the membrane, which thus loses its white appearance. When the water escapes from the pores by evaporation, or is driven from them by heat, the membrane again reflects white light from the numerous surfaces of its pores.

"As the colouring matter resides in the shell itself, its peculiar colour is seen through the epidermis as distinctly where it is porous as where it is not porous, when the porous portion has been rendered transparent by the absorption of a fluid.

"If we apply oil or varnish to the white pattern, we may obliterate it permanently, or we may change it into a pattern entirely different from the original one."—*Proc. Zool. Soc. Lond., Feb. 9th*, 1841.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## XXII. — OBSERVATIONS ON THE MINUTE ANATOMY OF FATTY DEGENERATION OF THE LIVER.*

*By William Bowman, Esq., F.R.S., Demonstrator of Anatomy in King's College, London; and Assistant Surgeon to King's College Hospital.*

Fatty degeneration of the liver is found almost exclusively in phthisical subjects. Louis met with it in forty out of one hundred and twenty cases. The organ is always enlarged in a degree proportioned, *cæteris paribus*, to the quantity of fat it contains. It is altered to a buff colour, resembling that of fallen leaves. In consistence it is nearly natural; and when sliced the knife is rendered greasy, and minute globules of fat appear, mingled with the blood. It has also an unctuous feel, greases paper, and readily inflames. This deposit of fat is never collected into masses, but is equally diffused throughout the whole viscus. It is remarkable that it occasions no obstruction to the portal circulation, as is clear, from its being always unattended with ascites. It never, indeed, gives rise to any symptoms (beyond those of mere enlargement) from which its existence might be suspected during life. Thus much is already known of the disease.

In examining under the microscope, a short time since, a specimen of this disease, taken from the body of a patient of Dr. Budd, in the King's College Hospital, I observed an interesting fact, denoting the seat of the fatty accumulation, which, with Dr. Budd's concurrence, I am desirous of communicating.

To make clear my meaning, I shall premise a very few words on the minute structure of the lobules of the liver. Mr. Kiernan has well described the *vascular element* of these minute representatives of the organ. It consists of a capillary plexus intervening between the portal and hepatic veins. The diameter of the capillaries in this plexus is very large, being nearly twice that of a blood globule; while the diameter of the capillaries in most other textures is the same as that of the blood globule, and in some (as muscle) even less, so that the blood globules only pass along by undergoing elongation. This large size of the capillaries of the liver, probably, has reference to the deficiency of propelling power in the portal circulation. This *portal hepatic plexus* may be termed *solid*, as it is extended in all directions, and presents

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* From the Lancet of January 22nd, 1842.

areolæ of nearly the same dimensions in whatever plane it is cut. These areolæ are in general not larger than the diameter of the vessels which form them, so that a well injected specimen might appear to be composed of little else than vessels.

In the interstices of this capillary plexus lies the *secreting portion of the bile-ducts*. If a thin section of an uninjected lobule be examined with a sufficient magnifying power, it is seen to be almost entirely made up of small, irregular, angular particles, each containing a circular or oval nucleus, within which is a minute point or two, the nucleolus. These particles have a determinate outline, are of some thickness, and possess a fine granular aspect. They also contain (which is very remarkable,) one, two, or more globules of fatty matter, irregularly placed, and of somewhat variable bulk, though usually about the size of those represented from the healthy human liver, at Plate III, Div. 6, A.

We owe the first good description of these nucleated particles to Henle,* who (with Purkinje and Schwann) believes that they correspond with the epithelium found in all other true glands, and that they are the proper glandular element, to which the secretion is due. No one who has extensively examined the minute structure of glands, can well be of a different opinion, though it must be allowed that we are still ignorant of the precise anatomy of the ultimate ramifications of the biliary ducts. The oily globules found in the nucleated particles, appear to have special reference to the chemical nature of the secretion, which contains a large quantity of highly carbonized matters, that are to be regarded, according to Dr. Prout, as modifications of the *oleaginous principle*. The nucleated particles of the sebaceous glands also contain fat, and in this respect offer a striking analogy with those of the liver.

The microscope at once reveals the seat of the *fatty deposit in the diseased state of the organ*. Instead of containing a few minute scattered globules, *the nucleated particles are gorged with large masses of it*, which greatly augment their bulk, and more or less obscure their nuclei. (See Pl. III, Div. 6, B.)

This simple description developes the whole anatomical condition of the disease, as well as explains its rougher characters, the bulk, the colour, and the freedom of the circulation. The particles, lying in the interstices of the capillary plexus, enlarge slowly and equably, in such

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* They have also been examined by other Foreign Anatomists, as well as British. Mr. Erasmus Wilson discovered them in 1838, in the liver of the cat, when as yet the works of Henle were unknown in this country.

a manner, as to exert no injurious pressure on the vessels, while their new contents impart that peculiar hue which characterizes the disease.

It also throws no little light on the nature and source of the disease. It seems to show that the fat is an *increase of a normal constituent*, and not a formation altogether unnatural in kind; thus distinguishing it from the fatty degenerations of other tissues, where fat is deposited in situations from which it is naturally absent. It likewise indicates an increased activity in the secreting action of the liver, for a considerable period before death, though why the *accumulation* of fat should occur within nucleated particles does not so clearly appear. To explain that fully, will require a more complete knowledge than we yet possess of the chemical affinities at play within these small laboratories of nature.

I cannot conclude without remarking, that the fact which has been detailed, is an admirable example of the kind and degree of insight into pathological changes, which the microscope is calculated to afford. It is happily unnecessary, in the present day, to come forward as the advocate of this invaluable instrument as an aid to the study of disease. The fact is also of uncommon interest, as an illustration of the strict subordination of the study of pathology, as well as that of *minute anatomy* and *minute chemistry*, as to semeiology and that coarse inspection of morbid changes, which has too long usurped the name of *morbid anatomy*.

*Explanation of the Figures, Plate* III, *Div.* 6.

A.—Nucleated particles from the healthy human liver.
B.—The same, from the liver affected with fatty degeneration.
*a, a.*—Nuclei. *b, b.*—Nucleoli. *c, c, c.*—Fatty globules.

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## XXIII.—FARTHER OBSERVATIONS ON THE FILLING UP OF RIVER-BEDS AND HARBOURS, BY MICROSCOPIC ORGANISMS.*

*By M. Ehrenberg.*

Specimens had been received from M. Hagen of the masses which had been removed from the harbour of the Oder at Swinemünde, and from that of the Vistula at Dantzic. The masses which had been removed at Swinemünde, amounted in 1839, to 2,592,000; and in 1840, to 1,728,000 cubic feet (German).

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* Abstract of the Paper read before the Berlin Academy, 10th June, 1841.

According to microscopical analysis, the mud of the harbour itself contained from $\frac{1}{3}$ to $\frac{1}{2}$ of its volume of distinguishable organic bodies. The sand taken from the navigable water outside of the harbour, appeared to be principally granitic quicksand.

The masses also deposited by the Vistula at Dantzic, and of which four specimens were sent, taken from the bed of the river, at various distances from the sea, according to a plan of the localities, were, indeed not so rich in microscopic organisms as those from Pillau, Cuxhaven, and Swinemünde, but as those from Wismar, on account of the great admixture of river sand, furnished only from about $\frac{1}{10}$th to $\frac{1}{6}$th of their volume of organic remains.

Marine forms, however, were found, at the point highest up the river, and marked No. 4, and from this locality also, was furnished the material least mixed with sand (Flugsand), and which was the richest in Infusoria.

Moreover the report, which was given in March of the results of investigation of the deposits of the Nile in Egypt and Nubia, in part furnished by the examination by Dr. Hemprich, on the small portions of earth adherent to plants collected in those countries, and the prospect thus opened of the possibility of readily arriving at a knowledge of these forms, from other and very distant parts of the earth, in a similar way, had prompted Professor Kunth, in the most liberal manner to furnish for microscopical examination, portions of earth which were adherent to some of the exotic plants in his rich herbarium. These materials were a portion of marine Conferva from the Falkland Isles, sent by M. Lesson; two specimens of Brazilian bog-earth (von Sellowschen Gräsern); a similar one from Peru, a portion of Conferva from the Sandwich Islands, and from the Marian Isles, both sent thence by M. Gaudichaud. All these materials, were respectively, as clearly from the places indicated, as the plants to which they were still attached.

Finally the author had received, by the kindness of the worthy traveller in Iceland, Dr. Thienemann of Dresden, at his request specimens of earth from Iceland, Labrador, and Spitzbergen. As the chief part of these materials thus belong to the American hemisphere, their investigation forms especially an addition to the "report, &c.," furnished on the 25th of March.*

From the examination in this way of the above mentioned particles, often extremely small, or scarcely a line in thickness from those distant

* Vide Ehrenberg's remarks, Vol. II., p. 26, of this Journal.

countries, the following results, as to the extent of animalcular life have been obtained.*

In the Malvinas or Falkland Islands the following 30 species of microscopic organisms still exist;—

1. *Achnanthes pachypus*
2. *Actinocyclus senarius.*
*3. *Amphora navicularis.*
*4. *Arthrodesmus Taenia.*
5. *Cocconëis placentula.*
6. ——— *scutellum.*
7. *Cocconema Lunula?*
8. *Eunotia Faba.*
9. ——— *amphioxys.*
10. ——— *biceps.*
11. *Fragilaria constricta.*
12. ——— *rhabdosoma.*
*13. ——— *Trachea.*
14. ——— *Ventriculus.*
15. *Gomphonema clavatum.*
16. ——— *minutissimum.*
17. *Grammatophora oceanica.*
*18. ——— *stricta.*
19. *Navicula amphioxys.*
20. ——— *aspera.*
21. ——— *Didymus?*
*22. ——— *Lyra.*
*23. ——— *peregrina.*
24. ——— *viridis.*
*25. *Surirella? australis.*
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26. *Spongia acicularis.*
27. ——— *capitata.*
28. ——— *Clavus.*
29. ——— *fustis.*
30. ——— *aspera.*

Out of all this number of forms, there are only seven new species,(*) which had not already been met with elsewhere. As a whole the forms belong to already known genera. Most of them are as yet only known as marine, and from this, it may with greater probability be concluded, that the whole of them are so. Several species belong to those, which assist in the formation of the chalk marl in the south of Europe.

For the Brazils, twelve still living species, from alluvial deposits are added to the nine already stated to have been met with in the edible clay of the Amazons, furnished by M. Martius, viz :—

*1. *Arcella ecornis.*
2. *Gallionella distans?*
3. *Himantidium Arcus.*
4. *Navicula viridis.*
5. ——— *amphioxys.*
*6. ——— *microstauron.*
7. *Surirella oblonga?*
8. *Synedra Ulna.*
———
9. *Lithodontium Bursa.*
10. *Lithostylidium Serra.*
*11. ——— *articulatum.*
*12. *Lithodermatium macrodon.*

* The new species, which as far as is yet known are characteristic of the countries, are marked with an asterisk.

There are among these, two new forms of Infusoria; but besides and accompanying them, silicious parts of phanerogamous plants, probably grasses, and of *Equisetaceæ*, are worth remarking. It would seem proper to distinguish such fragments with generic names in separate lists, in order they should not be disregarded; since it is not easy to determine to what plants they might belong. The silicious, marginal serratures of grasses are found plentifully under the silicious shields of the Infusoria. These will be named *Lithodontium (Thylacium)*. The serrated, silicious fibres of the elongated cells of grasses, which are not immediately the epidermis, will be named *Lithostylidium*, and the silicious epidermis of the *Equisetaceæ*, *Lithodermatium*.

By this means, such botanical forms, which are frequently very distinct and characteristic, and hitherto unremarked, can be retained and compared by the microscope, without loading systematic Botany with misapplied names, by groundless guesses at their origin.

From Peru, besides the five species of marine Infusoria already noticed, as yet only four, from the interior are known, viz.:—*Eunotia Zebra*, *Fragilaria?*, *Navicula viridis*, *Spongilla lacustris*, of which no form can with certainty be indicated as new.

The addition to the fauna of Iceland, afforded by the materials collected by Dr. Thienemann is especially interesting. He has furnished marine Confervæ from the coast, and peat from Husavic. The peat is very rich in silicious Infusoria, although it is a good, in fact the best, combustible material in the island. It contains not fewer than the following thirty-six species:—

1. *Amphiprora navicularis.*
2. *Amphora libyca.*
3. ——— *hyalina.*
4. *Arcella hyalina.*
*5. *Cocconeïs borealis.*
*6. ——— *longa.*
7. *Cocconema asperum.*
8. *Eunotia amphioxys.*
9. ——— *bidens.*
10. ——— *Diodon.*
11. ——— *granulata.*
12. ——— *gibba.*
13. ——— *prærupta.*
14. ——— *Zebrina.*
15. *Fragilaria striolata?*
16. *Gallionella distans.*
17. ——— *crenulata.*
18. *Gomphonema acuminatum.*
19. ——— *Americanum.*
20. ——— *longiceps.*
21. ——— *truncatum.*
22. *Navicula amphioxys.*
*23. ——— *æqualis.*
24. ——— *amphisbæna.*
25. ——— *gastrum.*
26. ——— *legumen.*
*27. ——— *liostauron.*
28. ——— *microstauron.*
29. ——— *nobilis.*
30. ——— *phœnicenteron.*

31. *Navicula viridis.*
32. *Synedra Ulna.*
33. *Tabellaria trinodis.*
34. *Thylacium semiorbiculare.*
*35. *Lithostylidium polyedrum.*
36. ——— *pupula.*

Of Icelandic marine Infusoria, procured from Algæ, sent by Dr. Thienemann, the following twelve species, still living, are found there, viz.:

1. *Cocconeis scutellum.*
2. *Denticella ? aurita.*
3. *Echinella ? Podosphenia ?*
4. *Gomphonema clavatum.*
5. ——— *minutissimum.*
*6. *Grammatophora islandica.*
7. *Navicula aspera.*
8. ——— *gracilis ?*
9. *Podosira moniliformis.*
*10. *Striatella Thienemanni.*
11. ——— *arcuata.*
12. *Synedra fasciculata ?*

Among the fossil forms of the peat, are five new and peculiar ones, and two among the marine Infusoria. In the whole number of forty-eight Icelandic Infusoria, there is no new genus; but it is worth while to remark the occurrence, together with the serrated Eunotiæ of Sweden, Finland, and North America, which are characteristic of the North, — of *Podosira moniliforms*, which is elsewhere met with only in Peru.

Equally interesting is the microscopic fauna of Labrador, which enumerates fifty-one living species, found in the earth, contained among the roots of some mosses. The following forms are found near Okok in Labrador:—

1. *Amphora libyca.*
*2. *Arcella disphæra.*
3. —— *hyalina.*
4. *Cocconema asperum.*
5. ——— *gracile.*
*6. ——— *Lunula.*
7. ——— *tenue.*
8. *Closterium striolatum ?*
*9. *Difflugia lagena.*
10. ——— *oblonga ?*
11. *Eunotia amphioxys.*
12. ——— *biceps.*
13. ——— *bidens.*
14. ——— *Camelus.*
15. ——— *Diodon.*
16. ——— *diadema.*
17. *Eunotia Faba.*
18. ——— *hexaodon.*
19. ——— *monodon.*
20. ——— *prærupta.*
21. ——— *septena.*
22. ——— *tetraodon.*
23. ——— *triodon.*
24. *Fragilaria binodis.*
25. *Himantidium Arcus.*
26. ——— *gracile.*
27. *Navicula amphioxys.*
28. ——— *aspera.*
29. ——— *ceratogramma.*
30. ——— *ceratostigma.*
31. ——— *crucigera.*
32. ——— *dicephala.*

33. *Navicula dilatata.*
34. ——— *gibba.*
35. ——— *gracilis.*
36. ——— *inæqualis.*
*37. ——— *isotauron.*
38. ——— *Legumen.*
*39. ——— *leptogongyla.*
40. ——— *microstauron.*
*41. ——— *pachyptera.*
*42. ——— *scalaris.*
*43. *Navicula semen.*
44. ——— *silicula.*
45. ——— *viridis.*
46. *Striatella arcuata.*
47. *Synedra Ulna.*
48. *Tabellaria trinodis.*
49. ——— *gastrum.*
50. ——— *biceps.*

51. *Lythostylidium rude.*

There are eleven peculiar species in Labrador, but no new genus among them.

From this list is afforded the very important result, that the northern *Eunotia*, which are here as elsewhere in northern countries, very numerous, occur in this locality with living *Closteriæ*, and such *Difflugia*, which are not preserved in the fossil state. Hitherto they were only known as fossil; and only one species, near Saltzburgh, has as yet been observed in the living state. They consequently appear to be forms peculiar solely to Northern climes, and will probably be found here and there in the Alps.

On this account, especially, was a small specimen of marine mud, from the bottom of the sea near Spitzbergen, examined with greater care and precaution. There were found in it nine species of the smallest organisms, among abundant clay? particles. Three Infusoria with silicious shields, one *Spongia* or *Spongilla*, and four or five species of calcareous *Polythalamia*:—

1. *Coscinodiscus patina?*
2. *Navicula aspera.*
3. *Synedra Ulna.*

4. *Spongia acicularis.*
5. *Triloculina trigonula.*
*6. *Nonionina arctica.*
*7. *Rotalia borealis.*
*8. *Uvigerina? borealis.*
*9. *Serpula? discus.*

Four of the *Polythalamia*, are hitherto undescribed. From the investigation of the former twenty-four American localities, which was presented to the Academy in March, there was afforded the sum of two-hundred and fourteen species of the smallest organisms, of which seventy-one were peculiar to America, ninety-four living, and one hundred and twenty fossil.

The six localities now adduced, which are in great measure new, and embracing half the globe, contain one hundred and fifty-four forms, of which one hundred and sixteen are living, thirty-eight fossil, and thirty-one

new; consequently the number of species peculiar to America, amounts to one hundred and two; of those known as common to America and the Islands, to two hundred and forty-five; and of those known to be yet living there to two hundred and ten.

Besides this we are now able to determine the thirty-nine following species from materials collected in the Sandwich Islands:—

1. *Amphiprora navicularis.*
2. *Cocconeïs placentula.*
3. *Cocconema fusidium.*
4. *Difflugia hyalina.*
5. *Eunotia amphioxys.*
6. ——— *bicornis.*
7. ——— *Cocconema.*
8. ——— *gibba.*
9. ——— *prærupta.*
10. *Fragilaria striolata.*
*11. ——— *lamella.*
12. ——— *trachea.*
13. ——— *diopthalma.*
14. *Gallionella distans.*
15. *Gomphonema augur.*
16. ——— *clavatum.*
17. ——— *longiceps.*
18. ——— *rotundatum.*
19. *Himantidium Arcus.*
20. *Navicula amphisbæna.*
21. ——— *ceratostigma.*
22. *Navicula curvula.*
*23. ——— *distauridium.*
24. ——— *gibba.*
25. ——— *gracilis.*
*26. ——— *insularis.*
27. ——— *pusilla.*
28. ——— *sigma.*
29. ——— *viridis.*
30. *Podosphenïa cuneata?*
31. *Staurosira construens.*
32. *Synedra scalaris.*
*33. *Tabellaria platysoma.*
34. ——— *rhabdosoma.*

———

35. *Lithodontium bicorne.*
36. *Lythostylidium rude.*
37. *Spongilla acicularis.*

———

*38. *Rotalia punctata.*
*39. *Nodosaria punctata.*

Of these thirty-four belong to the silicious Infusoria; three are silicious particles of plants; and two are calcareous *Polythalamia.* From the two latter forms the mass is distinctly indicated to be of marine origin. Six species are peculiar; all belong to known genera.

Finally there is a small fauna of the Marian Islands, in which may be reckoned thirteen species:—

1. *Cocconema fusidium.*
2. *Fragilaria diopthalma.*
3. ——— *rhabdosoma.*
4. *Gomphonema Augur.*
5. ——— *clavatum.*
6. ——— *longiceps.*
7. *Himantidium Arcus.*
8. *Navicula pusilla.*
9. *Navicula viridis.*
*10. *Tetragramma libycum.*

———

11. *Spongia acicularis.*
*12. ——— *Amphidiscus.*

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13. *Rotalia globulosa.*

This small number contains two new species, and the *Rotalia* of the chalk, the lower shell of which is here abundant, indicates the marine or brackish origin of these animalculæ. Moreover the occurrence here of *Tetragramma Libycum*, is remarkable, as being a form which a short time since was met with in saliferous earth brought from Siwa, in the Oasis of Jupiter Ammon, and at one time was found nowhere else.

As a general result of these researches, the following may be proposed:—

1. There are in Iceland as in North America, useful beds of good peat, consisting, in great part, even to as much as the $\frac{1}{3}$ of their bulk, besides vegetable remains, of dead microscopic animalcules—whilst the most common European good kinds of peat, although Infusoria when sought for are rarely found wanting in them, have not hitherto been found to contain them in the same proportion.

2. There is a minute organic invisible life diffused entirely through those parts of the soil rich in humus; but sandy situations of the earth's surface from near the South to the neighbourhood of the North Poles, and the bottom of the sea near the North Pole, are also filled with similar organic forms.

3. It is possible according to the method of research pursued by the author, to render evident the forms in which this life occurs, from the smallest particles of earth adhering to the plants in Herbaria, or to bodies of any kind; and to determine much further than has yet been done, with ease and scientific certainty, a more or less numerous fauna of microscopic organisms, from all parts of the earth.

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## XXIV. — CONTRIBUTIONS TO VEGETABLE EMBRYOLOGY, FROM OBSERVATIONS ON THE ORIGIN AND DEVELOPMENT OF THE EMBRYO IN TROPÆOLUM MAJUS.*

*By Herbert Giraud, M.D.*

After referring to the researches of MM. Schleiden, Wydler, Mirbel and Spach, and A. St. Hilaire, on this important point, Dr. Giraud states that he was induced to select *Tropæolum* as the subject of his own observations on account of its solitary ovula, and their compara-

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* Abstract of a Paper read before the Linnæan Society, February 1st, 1842, and published in the Proceedings of that body.

tively large size, which render the individuals of this family, as well as the allied *Geraniaceæ*, peculiarly fitted for the purpose. He arranges his observations under seven general heads corresponding with as many progressive periods in the growth of the female organs, and extending from the completion of the anatropous development of the ovule to the perfect formation of the embryo; or from the commencement of the expansion of the bud to the complete formation of the fruit. The results are collected from a great number of dissections.

In the *first* period, or just before the expansion of the bud, a longitudinal section of the carpellum from its dorsum towards the axis of the pistillum, dividing the ovule, shows the latter to have completed its anatropous development. A portion of rather firm and dense cellular tissue enclosing a bundle of vessels descends from the placenta and in apposition with it to form the raphe, and terminates in the base of the ovule. The nucleus has only one integument, at the apex of which is the exostome or micropyle, opening close by and to the outside of the point of attachment; and the conducting tissue of the style may be traced into the carpellary cavity as far as the exostome.

In the *second* period, during which the expansion of the bud and the dehiscence of the anthers commence, and therefore before impregnation, a small elliptical cavity makes its appearance near the apex of the nucleus, having a delicate lining membrane formed by the walls of the surrounding cells: this cavity is the embryo-sac, and a minute canal may be traced leading from it to the exostome. The apex of the embryo-sac encloses at this period a quantity of organizable mucilage containing many minute bodies having the appearance and character of cytoblasts.

In the *third* period, the apex of the nucleus and of its integument becomes slightly inclined towards the placenta. The embryo-sac is much enlarged and lengthened; its mucilage has disappeared and given place to an elongated diaphanous utricle (*utricule primordiale*, Mirbel; *vésicule embryonnaire*, Meyen; *extrémité antérieure du boyau pollinique*, Schleiden;) containing a quantity of globular matter or cytoblasts. This primary utricule is developed wholly within the embryo-sac, from which it is obviously distinct.

The *fourth* period occurs after impregnation. The pollen tubes do not extend into the carpellary cavity; but the fovilla with its granules is found abundantly in the passage leading from the style to the exostome. With the increased development of the embryo-sac, the primary utricule elongates and becomes distinctly cellular by the development of minute cells in its interior, while at the extremity next the base of the

nucleus it is terminated by a spherical mass consisting of globular cells. The primary utricle at this period assumes the character of the suspensor (Mirbel), and its spherical extremity constitutes the first trace of the embryo.

In the *fifth* period the apex of the nucleus and of its integument becomes more inclined towards the placenta; the spherical extremity of the suspensor enlarges, and it becomes more evident that it constitutes the rudimental embryo. In the mean time the suspensor has become lengthened by an increase in the number of its cells; and its upper extremity is found to be protruded through the apex of the embryo-sac, the apex of the nucleus and the micropyle. From this extremity there is a considerable development of cells, many of which hang loosely in the passage leading to the conducting tissue of the style, while the rest unite in forming a process which passes down the outer side of the ovulum within the carpellary cavity. This process is composed of from nine to twelve rows of cells, and its extremity resembles in appearance and in the anatomical condition of its cells the spongiole of a root. By a slight traction of this cellular process the suspensor with the embryo may be withdrawn from the embryo-sac through the exostome, thus proving the continuity of the process with the suspensor, and through it with the embryo itself.

During the *sixth* period the suspensor becomes more attenuated; and the cellular process has reached the base of the ovulum, the cells of its extremity abounding with cytoblasts, which prove that it is still progressing in development. The embryo also increases in size, and two lateral processes are observed, which evidently form the first traces of the cotyledons.

In the *seventh* period all distinction between the nucleus and its integument ceases, and they form a single envelope enclosing the embryo-sac; the cellular process has become so much developed, that its extremity has passed round the base of the ovulum and is directed towards the placenta; and the lateral processes of the embryo have become distinct fleshy cotyledons, enclosing both the radicle and plumule in corresponding depressions of their opposed surfaces. The subsequent changes consist chiefly in the great development of the cotyledons, which ultimately occupy the entire cavity of the nucleus, filling the space usually taken up by albumen.

From these observations Dr. Giraud deduces the following inferences: —The formation of the embryo-sac and the development of cytoblasts within it having been shown to take place at a period prior to impregnation, and even the primary utricle itself making its appearance before

the emission of the pollen from the anther, and before the expansion of the stigma, the origin of the primary utricle cannot be referred to the influence of impregnation, nor can it have been derived from the pollen tube pressing before it a fold of the embryo-sac.

The primary utricle at its first formation being quite distinct from the embryo-sac, even at its apex (although brought into contact with it at a subsequent period, and ultimately penetrating it), cannot result from a depression or involution of the embryo-sac, as is maintained by M. Brongniart.

The pollen tubes (which after impregnation may be traced in the conducting tissue of the style) never reaching the micropyle, but pollen granules being found in abundance in the channel leading to it, and being doubtless brought into contact with the outer surface of the embryo-sac through the exostome; and the first trace of the embryo appearing at this time in the formation of the spherical body at the inferior extremity of the primary utricle—Dr. Giraud is led to conclude that the origin of this simple spherical body results from a peculiar process of nutrition, determined by the material or dynamic influence of the fovilla, conveyed through the medium of the primary utricle or suspensor.

The paper was accompanied by a series of drawings representing the ovulum of *Tropæolum* in the several stages of development described.

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## XXV.—CONTRIBUTIONS TO THE MINUTE ANATOMY OF ANIMALS.*

*By George Gulliver, F.R.S., &c.*

As minute anatomy is now become more generally interesting than formerly, and begins to assume the character of an extensive and comparatively accurate science, so as to give a new complexion to some of the most important questions in physiology and pathology, and to enable us to submit many old doctrines to a more exact scrutiny than most of our classical anatomists had the means of employing, it appears to me that considerable advantage might arise if different independent observers would more frequently publish a brief yet clear account of the results of their inquiries. Hence I propose to communicate occasionally to the Philosophical Magazine, a series of short notes on the ultimate structure of various animal tissues and on the elementary forms which occur in the fluids, taking the discriptions in all cases from my own observations, and frequently illustrating them with wood-cuts. It will thus be at-

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* From the Philosophical Magazine, June, 1842.

tempted to give either a more precise account than we yet possess of some of the healthy and diseased parts of man and the lower animals, to present certain particulars of structure in novel physiological relations, or to record facts which may appear to have escaped the attention of previous observers: in short, to contribute summary and plain notes concerning numerous detached anatomical points which may perhaps be treated of as profitably in this manner as by set dissertations.

### ON THE LYMPH-GLOBULES OF BIRDS.

It is well known that the blood of the vertebrate animals contains, besides the numberless red discs, a few pale globules which have very commonly been regarded as those of lymph. In birds, however, the globules which constitute the greater part of the juice of the lymphatic glands are generally rather smaller than the pale globules of the blood; and, as I have noticed in the Appendix to Gerber's Anatomy, the same fact is observable in the mammalia. Yet the descriptions given since Hewson's time of the lymph-globules of birds have always been drawn from the pale globules of their blood.

The distinguished inquirer just mentioned, states that the particles of the fluid of the lymphatic glands of birds are oval, like the nuclei of their blood-corpuscles. In the Philosophical Magazine for February 1840, I gave an account of the lymph-globules of the Musk Deer, from which it appears that these scarcely differ in size from those of man, notwithstanding the blood-discs of this little ruminant are the smallest at present known; and although the Camelidæ have oval blood-corpuscles, I found that the globules of the thymus, of the lymphatic glands, and of the pus of these animals, had the usual circular figure, and nearly the same size as the corresponding globules in other mammalia.* It was to be expected, therefore, that the lymph-globules of birds would possess a similar form, and this I have lately ascertained to be the case.

The lymph-globules of birds are commonly rather smaller than those of mammalia, yet this difference of size is not observable to the same degree in the pale globules of the blood of these two classes. The account of the chemical characters of the lymph-globules of mammalia, as given in the Appendix to Gerber's Anatomy, is generally applicable to the corresponding globules of birds. Professor Wagner observes, that the chemical properties of the pale globules of the blood and the nuclei of the blood-discs of birds and reptiles are identical. This appears to be true in most respects; but in certain experiments the two

* See Medico-Chir. Trans., vol. xxiii; and Lancet, 1840-41, vol ii, p. 101.

kinds of particles seem to me to be differently affected under precisely the same treatment. Thus the nucleus of the blood-corpuscle is not so prone to change in drying as the lymph-globule. The former, whether exposed in recent blood by acids, or in dry blood by the moisture of the breath, may be quickly dried, and the form of the nucleus thus completely preserved, on the slip of glass used to make the observation; while the lymph-globule after similar treatment, and even if dried without any addition, becomes either faint, tumid, or misshapen. Certain saline solutions too, which, in a few hours, either injure the shape of the lymph-globules or render them almost invisible, do not act so remarkably on the nuclei of the blood-discs.

The pale globules noticed in this paper are those well-known white and slightly granular corpuscles which are generally seen at once very plainly in the blood, as they appear, under certain adjustments of the object-glass, with a distinct and dark circumference. But there are other pale particles in the blood. Some of these are isolated, and agree in all respects with the globules of the lymphatic juices, being smaller, often rather fainter and with a less definite contour than the pale globules first mentioned. In the blood after death there is also frequently observable small shapeless white fragments consisting of circular or oval granules hardly as large, seldom larger, than the globules of the lymphatic fluid; and minute oil-like particles are often seen in the fragments. In birds this granular matter often exactly resembles in structure the colourless fibrine, obtained from their blood by washing it in a linen bag, and the granules are frequently just like the nuclei of the blood-discs. The white granular matter is often abundant when the pale globules are either difficult to be found or entirely absent.

The following measurements of the lymph-globules are expressed in fractions of an English inch; the common sizes are first noted, then a space is left, after which the measurements of the small and large globules are given; and lastly, beneath the lines, the mean size deduced from the whole observations:—

| 1. Pigeon (*Columba Livia*, var. Briss.) | 2. Song Thrush (*Turdus musicus*, Linn.) |
|---|---|
| 1-6000 | 1-6000 |
| 1-5333 | 1-4800 |
| | |
| 1-7110 | 1-8000 |
| 1-3800 | 1-3500 |
| 1-5274 | 1-5090 |

3. Common Fowl (*Gallus domesticus*, Briss.)

1-6400
1-6000

1-8000
1-3200

1-5261

4. White Owl (*Strix flammea*, Linn.)

1-6000
1-4800

1-7110
1-4000

1-5227

5. Young Heron, half-grown (*Ardea cinerea*, Lath.)

1-5672

1-6400
1-4000

1-5150

6. Rook, (*Corvus frugilegus*, Linn.)

1-5333

1-6400
1-4000

1-5053

7. Jackdaw (*Corvus Monedula*, Linn.)

1-6000

1-8000
1-3555

1-5238

8. Starling (*Sturnus vulgaris*, Linn.)

1-5600

1-7110
1-3800

1-5152

9. Jay (*Garrulus glandarius*, Flem.)

1-6000
1-4000
1-3600

1-6400
1-3200

1-4414

10. Magpie (*Corvus Pica*, Linn.)

1-6000
1-5333
1-4800

1-6400
1-3555

1-5001

Pale globules of the blood.

1-4000
1-3200

1-5333
1-2666

1-3555

11. Greenfinch (*Fringilla Chloris*, Temm.)

1-6000
1-4800

1-6400
1-3555

1-4924

| 12. House Sparrow (*Fringilla domestica*, Linn.) | 13. Yellow Bunting (*Emberiza Citrinella*, Linn.) |
|---|---|
| 1-6000 | 1-5333 |
| 1-4570 | 1-4572 |
| 1-6400 | 1-6400 |
| 1-3200 | 1-3200 |
| 1-4682 | 1-4572 |

These measurements, excepting No. 5, were obtained from the particles of adult birds at different seasons. The lymph-globules in most of the above-named species, do not differ much in magnitude; and it is possible that further observations may show as much variety in the size of the globules of any one bird, especially if examined at different periods and compared in growing and mature specimens. In a few instances from one to five of the globules were seen to be inclosed with granular matter in a cell, the diameter of the latter varying from 1-2600th to 1-1114th of an inch. If the lymph-globule be regarded as a cell-nucleus, of course the smaller rounded particles which it frequently contains will be nucleoli. Sometimes from two to six of these may be observed in one lymph-globule, in which case they are very minute; and it is not unusual to see a single central and larger nucleolus varying from a quarter to half the size of the lymph-globule.

## Extracts and Abstracts from Foreign Journals.

[From *Schlechtendal's Linnæa*, 1842.]

*Mohl on the Structure of the Punctated Vessels of Plants.* (Continued from p. 122.)—Under these circumstances the question arises, — Shall we consider all the before mentioned forms of vascular tissue as *true punctated vessels*, or shall we thus alone regard those which possess on all sides dots surrounded with a circle, looking upon the others as *mixed vessels*; or rather, ought we to make new and special divisions of vegetable ducts in order to embrace the different varieties and appropriate to them names? The first proposition appears to be the best; for on the one hand they have a common character in the possession of a dot surrounded with a circle, and which easily distinguishes them from other vessels, and on the other hand the presence of which is on the whole corelated to a dicotyledonous embryo. [After alluding to reasons why the other propositions should not be followed, the author thus proceeds.]

In order to investigate the nature of the punctations, the best plant to examine is *Cassyta glabella*, as in this they are very large. In this

plant with delicate transverse or longitudinal sections, it is easily seen that the circle of the dot proceeds from a hollow or excavation between the contiguous parietes of the vessels; and the dot, or point, itself is a canal having a tender membrane at its outer end running from the interior of the vessel towards this hollow.

[The author then alludes to varieties resulting from pressure, different appearances of the canal and circle resulting from different sections, &c.] Besides these dots which have a circle, there are others as we have before remarked, met with in a great many plants which are devoid of it. A due examination, especially with transverse or oblique sections of the vessels, shows that between these dots and adjacent lying organs there is no hollow or excavation, but that the dot is formed by a simple gap or chasm of the secondary layer of the tube, and therefore completely simulates the dots of parenchymatous cells, and of reticulated and scalariform ducts.

In punctated vessels septa may be found under two forms. A greater portion of the original partition, having a round hole in its centre, remains, or else the partition is broken through by several contiguous transverse spaces, so that they appear like the walls of scalariform ducts. The former kind may be found in Cassyta glabella, &c.; the latter in Ilex aquifolium, &c.

Concerning the development of these vessels we may remark, that in their earlier period of evolution they appear like the other vessels, as rows of large cell-like completely closed tubes, the membrane of which is thin and homogenous and each contains a nucleus. Afterwards a delicate fibrous net is observed on their walls, especially on those which lie next to other vessels. Their further development shows that this net does not depend upon secondary fibres on the inner surface of the wall of the vessel, but that the meshes of the net answer to the after circles of the dots and to indicate the hollows or excavations which lie between the vessels, and that the distinct fibres which surround the meshes are formed through the position of the vascular parieties which remain in connection with adjacent organs.

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[From *Valentin's Repertorium*, 1841.]

*Van Beneden on Alcyonella.*—The author remarks that in the same polypoid aggregation both male and female animals exist. The testicles of the former, like the ovaria of the latter, are placed behind the stomach. The seminal animalcules leave the testicles and spread themselves through the interior of the Polyps. The number of males is far less than that of the females. In the interior of the body a circulation is carried on by means of the motion of cilia. The skin, as also the external surface of the intestines are apparently provided with cilia. At the base of the tentacules appears a row of openings for the entrance of water into the interior of the body. The nervous system is apparently composed alone of a single ganglion placed above the œsophagus. The young creatures live in a free and isolated state, have a very rapid

motion produced by cilia, and simulate Planaria; in this condition they may also be found within the Polyps, and it was remarked in the examples under observation, that every two were enveloped in a sort of case. Several Polyps contained as many as six intestinal worms around the canal.

*Rathke on Actinia plumosa.*—Milk-white mucoid filaments were observed to pass out of the tegumentary pores, which glistened, moved sometimes for a long period in a circle, and contained crystals and granular mucus.

*Kobelt on Trichina spiralis.*—This parasite was found in all the transversely striated muscles, except of the heart and the small muscles of the ear, in a dropsical man of weak intellect, and of seventy-three years of age. None were found in other organs. Generally each cyst contained one worm, more rarely two, and very seldom three, and but rarely they possessed none. *Bischoff* submitted the worm to microscopic examination; according to him it lies always in a double cyst. The external one is of a citron shape, the internal is oval and does not proceed into the poles or ends of the external covering. In other respects the coverings are close together. The poles of the outer cyst, which is $\frac{1}{50}$th of an inch long, and $\frac{1}{95}$th broad, are filled with small dark granules possessing a particular motion when free. The inner cyst measures $\frac{1}{77}$th of an inch, and contains a more or less granular mucoid fluid, which is sometimes clear at others not; in the latter case the worm cannot be observed. The walls of both cysts are composed of a firm homogenous slightly granular texture. The worm lies rolled up in a spiral manner, is from $\frac{1}{25}$th to $\frac{1}{30}$th of an inch long, and from $\frac{1}{100}$th to $\frac{1}{500}$th broad, it continues alive very long, even in decomposing muscles. In the cyst it remains quiet, but out of it, in water it unrolls and rolls itself up again. An oral and caudal aperture were not to be seen. The tubular intestine appears to commence at the blunter or head-like extremity with a narrow œsophagus, in the larger portion of the body to occupy the whole space and have constrictions at intervals, whilst inferiorly it is more tubular and runs in a zigzag direction. It contains a granular mass, and moves rythmically backwards and forwards. Often a small dark spot is observed at the interior portion of the body, this which is granular is the ovarium. Sometimes after pressure a tube is discernable which perhaps is an oviduct. In the middle of the body runs a longitudinal stripe, either a vessel or a nerve. The following characters of the genus and species is given by the author: —

*Trichina.*—Animal pellucidum, filiforme, utrinque, postice magis, quam antrorsum adtenuatum; ore et ano discreto dubis, tubo intestinali et ovario instructum. In vescia duplici externa dura et elastica contenens alteram, in qua entozoon plerumque solitarium.

*T. Spiralis* T. minutissima spiraliter, raro flexuose incurva, capite obtusa, collo nudo, cauda adtenuata, obtusa. Vesica externa elliptica, extremitatibus plerumque adtenuatis interna ovalis.

[In our next number will be found some critical remarks of Valentin upon the above.]

[From the *Medicinische Zeitung*, 1842.]

*Simon on the presence of living Animals in the Tubercles of Acne punctata.*—It is generally believed that the tubercles of Acne punctata have their seat in the sebaceous crypts of the skin, but according to M. Simon, they more particularly effect the piliferous bulbs. He is led to this opinion from the fact of hairs being often present in the matter squeezed from them, even as many as fourteen having been observed.

Another peculiarity not less interesting is the existence of living animals in the same matter. These microscopic animalcules (of which our author has examined as many as forty individuals) have ordinarily a length of $\frac{1}{600}$th to $\frac{1}{900}$th of a line, and a breadth of $\frac{1}{200}$th. At the anterior portion of the body four pairs of feet, each foot having three articulations, are seen, the first articulations being provided with three delicate uncini. On the posterior portion of the head exists two bi-articulate mobile organs, between which is a sucker having two bristles. The posterior portion of the body is ordinarily very much elongated, and rounded at its termination, whilst in a few instances it is shorter and ending in a point.

According to the entomologists of Berlin, these creatures are *Acari* in the primary period of their development. The presence of them according to M. Simon, is not always constant in the disease under discussion.

In order to examine them, the matter prepared from the tubercles must be spread out by compression between two plates of glass, but in doing so care must be taken that the animals are not crushed, and the better to prevent which is, to place two delicate stripes of caoutchouc between the plates near their edge. In this manner they may be preserved alive several hours in a drop of oil, and their movements studied by aid of the microscope.—*No.* 9.

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[From the *Journal de Pharmacie et de Chimie.*]

*Soubeiran and Henry on the adulteration of Milk.*—It has lately been widely promulgated that a new method of adulterating milk has been adopted by adding to it, after the cream has been removed, a certain quantity of the brain of the calf or sheep. This was afterwards denied by the paper that at first announced it, but failed to quiet a great portion of the population of Paris, as the use of milk is almost universal. It was therefore necessary to destroy this false impression, and became urgent to find out means for the detection of the adulteration, supposing that it was effected in a single instance. In a memoir on this subject, read at the Academy Royal of Medicine by Gaultier de Claubry, several characters were given, derived from the physical properties of adulterated milk, compared with those of unadulterated liquid, as seen under the microscope as well as from analytical inquiry. Charged conjointly with Rocheux to make a report on the subject, we have been able to establish the exactitude of the greater portion of the assertion of G. de. Claubry, but at the same time it has been very evident to us that the procedures offer in their execution some difficulties,

when we take into consideration that a microscope is not always at hand, and that every body is not familiar with difficult and complicated chemical manipulations.

When the brainy matter of the sheep or calf is added, either directly to the milk, or in emulsion with water in the proportion of 5 per cent the physical properties of the milk, its odour, savour, colour and density, are not so notably altered as to allow the adulteration to be at once perceived, and which is therefore happily without danger as respects the animal economy. But seen by the aid of a good microscope, under an amplification of from 300 to 500 diameter, fragments of tubes, of torn rugose membrane, sometimes even sanguiferous vessels are observed by the side of the ordinary milk globules, the former being very different from the yellowish amorphous masses presented by milk after it has been boiled, or from that which is mingled with *colostrum* shortly after an animal has given birth.

Nevertheless it must be owned that these characters are not always so evident, and further the illusions which the microscope presents to those not very familiar with its employment are so frequent, that observers may be very easily led into error. We therefore prefer having recourse to a method founded on the property which the oleo phosphoric acid possesses,—and which as shown by Fremy exists in the brain—of changing under the influence of acidulated water, into oleine and phosphoric acid.

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[From the *Pharmaceutical Journal.*]

*Pereira on the Structure of Amylaceous Matters.* — Several feculent amylaceous or starchy substances are extensively used as food and medicine, and for other purposes. In commerce the cheaper are sometimes substituted for the more costly kinds, but the microscope offers a ready means of distinguishing the fraud. Particles of starch are organized substances. Their size is subject to considerable variation. The *tous les mois* obtained from a species of *Canna* has the largest sized particles; the Portland arrow-root from *Arum maculatum*, a very small particle. The shapes are also different; some are circular as wheat starch; others are elliptical or ovate as *tous les mois;* some are mullar shaped as Tapiti arrow-root, Brazilian arrow-root, and Tapioca. All have on some part of their surface a small circular spot called the *hilum*, and present an appearance of rings or rugœ, which depend on the concentric layers of which each grain is composed.

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[From the *Comptes Rendus*, 1842.]

*Gruby's Anatomical Researches on a Cryytogamic plant constituting the true Muguet* of Children.*—The greater number of pathologists consider the pseudo-membranous production in *muguet* a consequence on idio-

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* *Muguet* a pellicular disease occurring in the mouths of children.

pathic inflammation; others, on the contrary, affirm that the inflammation is of a symptomatic character. Opinions are also divided in respect to the transmission of this disease: some contending for its contagious nature, whilst others firmly deny that it is so.

*Muguet* shows itself under the form of white patches covering the entire mucous membrane of the mouth, and extending sometimes to the pharynx, œsophagus, stomach, and small intestines. At its commencement the disease is characterised by small conical whitish elevations, of 0.25 of a millimeter in diameter, dispersed over the buccal mucous membrane; these elevations, in a short time, continue to enlarge, and extend rapidly under the form of a false membrane firmly adhering to the subjacent tissue, having a thickness of from two to three millimetres, and covering sometimes the whole extent of the digestive canal.

A portion of this substance on being submitted to the microscope, shows that it is solely composed of a mass of cryptogamic plants. In order to study the characters of these vegetables, and perceive their relations to the tissue on which they grow, it is necessary to examine one of the isolated cones to be found towards the onset of the disease. Each of these cones is composed of a multitude of individuals provided with rootlets, ramifications, and sporules.

The rootlets are implanted in the cellules of the epithelium; they are cylindrical, transparent, about the $\frac{1}{400}$th of a millimetre in diameter; in being developed they perforate the entire series of cellules composing the epithelium, to arrive at the free surface of the mucous membrane.

The stems growing from the surface of the epithelium are equally transparent, divided at different distances by partitions, and enclosing corpuscules in their interior; they are cylindrical, straight, of a $\frac{1}{4}$th of a millimetre long, and $\frac{1}{400}$th of a millimetre in breadth: the stems divide into branches or ramifications, which subdividing bifurcate at an acute angle. These ramifications are composed of very distinct oblong cellules, enclosing one, two, or three, round and transparent nuclei; their lateral parietes present here and there sporules, and their extremities particularly, a very great number. The diameter of these sporules is from the $\frac{1}{200}$th to the $\frac{1}{500}$th of a millimetre.

These Cryptogamic plants bear a great analogy to the *Sporotrichium*, described by several botanists.

As they are very fragile, they become detached by the movements of the organs of the mouth, and mixing with the food, are carried into the digestive canal where they frequently germinate and cover a considerable surface; children in whom the extension of this disease is great, fall into a state of marasmus, and generally sink under it. As we have constantly met in this white substance of *muguet* nothing more but vegetables and cells of epithelium, and no product of inflammation, we consider it fair to conclude that this disease is produced entirely by the growth of a cryptogamic plant on living mucous membrane.

These low vegetable forms offer a great analogy to the *Mycodermata** of *Tinea favosa;* but they differ in the following characters:—

* See the figures and Mr. Busk's "Observations on Parasitical Growths on living animals." Microscopic Journal, Vol. I, p. 148.

1. The *Mycodermata* of *Tinea favosa* are contained in proper capsules; the *Cryptogamia* of *Muguet*, on the contrary, are developed on the surface of the epithelium, and not in capsules.

2. In the *Mycodermata* the moniliform ramifications are transformed into sporules, whilst in the *Muguet* the sporules are developed on the sides of the ramifications.

3. The cellules of *Mycodermata* are not well developed and do not present internal nuclei; on the contrary those of *Muguet* have very distinct nuclei.

4. The ramifications of *Mycodermata* are curved, whilst those of *Muguet* are rectilinear.

5. The ramifications of *Mycodermata* do not possess cellules at the point where they are given off from the stem, whilst those of *Muguet* present them.

Exposed to atmospheric air, the cryptogamia became dry, their cellules become slightly rugose and more transparent; in drying them with the epithelium in which they were developed, the rootlets can be followed to their very extremities; in water they swell; in milk they may be preserved as in water, without becoming more developed; by maceration in water they do not alter; after the death of the individual these vegetables do not undergo any change until the period when Infusoria become developed and destroy them by degrees.—*3rd May.*

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*Léveillé on the genus Sclerotium.*—In this memoir the author enumerates the great number of species that have been comprised in the genus *Sclerotium*, and shows that this supposed genus is formed of individuals of a different nature which ought not to be found united.

The genus *Sclerotium* may be divided into four sections. The first comprehends those pathological alterations produced by insects or parasitic Fungi; the second, Fungi in the act of growth or arrested in their development; the third, species belonging to other genera which have served to form new ones; and the fourth, species nothing else whatever but varieties.

In considering the place in Mycological classifications, which *Sclerotium* ought to occupy, he shows by observations that it is decidedly misplaced, because it forms imperfect beings, mere sketches of vegetation, presenting no trace of organs of fructification, and which in spite of that, under the influence of given circumstances, vegetates afresh and produces perfect Fungi.—Thus the *Sclerotium fungorum* gives birth to the *Agaricus parasiticus*, the *Sclerotium lacunosum* to *Agaricus racemosus*, *Sclerotium pustula* to *Peziza Candolleana*, *Sclerotium durum* to *Botrytis cinerea*, &c. These facts established upon a large number of observations, are in a measure verified by other similar ones taken from Rumphius, Micheli, Tode, Corda, &c.

He at length compares *Sclerotium* to other equally barren modifications of the fungoid tissue, and he endeavours to show that these productions are only forms of mycelium or the primitive element of Fungi

caused by the situation in which they are developed and by the excess or the want of action of air, light, humidity, and temperature.

He distinguishes four forms of *Mycelium* :—

1. The Filamentous or Nematoid *Mycelium*, composed of white or coloured chambered filaments, anastomozing with each other; these form the genera *Athelia*, *Hupha*, *Himantia*, &c.

2. The Membranous or Hymenöid; exhibiting membranes of a greater or less degree of thickness known by the names of *Racodium* and *Xylostroma*.

3. The Tuberculous or Scleroïd, the principal subject of this memoir.

4. The Pulpy or Malacoïd, which is fleshy, soft, and found in the genera *Phlebomorpha* and *Mesenterica*.

The following are the conclusions to which he arrives :—The greater number of Fungi proceed from a *Mycelium* which appears to be a particular kind of vegetation or evolution of spores. This *Mycelium* presents itself under four principal forms; it is often long lived, and vitality can be suspended in it for a greater or less time, and made to appear under the influence of favourable circumstances. Endowed with this power, it is manifest, nature has reserved it as a means of reproduction and preservation of the species.

The genus *Sclerotium* is but one of these forms; it ought not therefore to be considered a genus. It is the same with *Acrospermum*, *Rhizoctonia*, *Fibrillaria*, *Himantia*, *Athelia*, *Hypha*, *Rhizomorpha*, *Mesenterica*, &c.

All Fungi, and every myceloïd tissue, under whatever aspect it presents, are but individuals either in the act of growth or arrested in their development.

These productions are far from being perfectly known. The time has not yet arrived to efface them from the history of Fungi; on the contrary, they merit more than ever the attention of Botanists because they are natural experiments of which unexpected results may be obtained on the reproduction of Fungi.—21st *March*, 1842.

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[From the *Annales des Sciences Naturelles*, 1841.]

*Milne Edwards on the existence of Sexes in Æquorea violacea.*—In this species, as in others of the same genus, hitherto described by zoologists, there is to be found at the inferior surface of this animal of the family of *Medusa*, called *Cryptocarpia*, a number of membranous lamellæ, arranged in a radiated manner around the stomach, and corresponding to the canals described as passing from that viscus to the border of the expansion (ombrelle); they occupy however only about three quarters of their length, as they do not commence immediately at the margin of the mouth, and terminate at a sufficiently distinct distance from the border of the expansion (ombrelle). Two of these lamellæ are suspended in a parallel manner below, each of these tubes similar to a riband folded upon itself, as would make it appear double. Seventy-four of these double radiated lamellæ may consequently be counted,

which are free at their inferior margin, and plaited on either side; a great number of oblique striæ may also be seen, of a violet colour, and on submitting them to the microscope, M. Edwards is convinced they constitute the sexual apparatus of these *Acalephæ*. Thus, in some he has met with granules having all the appearance of ovules, and in another individual, where these bodies did not appear the same, he saw a multitude of zoosperms escape, which were extremely lively, and analogous in their form and movements to the spermatic animalcules of the Aureliadæ, and various other Mollusca. It therefore appears evident these lamellæ are either ovaries or testicles, according to the individuals examined, and that in relation to the reproductive organs, the *Æquorideæ* differ from the ordinary *Medusæ*, not because they are deficient of a special generative apparatus, or that it is concealed, but solely by the external position and arrangement of the sexual organs; among the *Acalephæ* named *Phenerocarpia*, these organs are deeply imbedded among the roots of the prolongation of the mouth, and enter into the composition of the walls of the stomach; whilst among the *Æquoridæ*, which have received the name of *Cryptogamia*, these very organs are altogether distinct from the central digestive cavity, and freely float at the external part under the inferior surface of the expansion (ombrelle).—*October*, *p.* 198.

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*Milne Edwards on the Microscopic Examination of the Tissue of some Acalephæ.*—In his description of *Beroe Forskalia*, it is stated, that on subjecting the tissue of *Acalephæ* to the microscope, a multitude of extremely delicate filaments may be seen crossing each other in various directions, and which might possibly be of a muscular nature. There also exists(?) near the surface of the body, an immense number of pyriform corpuscles terminated by a sort of tail, very slender and very much resembling those covering the skin of certain *Medusæ*, whose office is probably that of secreting organs. M. Edwards imagines these small glands might be the source of that phosphorescence so well known in the genus *Beroe;* but on carefully examining this luminosity it appeared to proceed principally from the vicinity of the ciliated margins, whilst it is in the interval comprised between these margins that the pyriform granules are found. The light given out by these animals, had been noticed by Forskal and more recently by Rolando; it is of a greenish hue, and is sometimes very vivid; to cause the animal to emit it, excite the same by mechanical irritation; but when the discharges rapidly succeed each other, their intensity becomes very much diminished.—*October, p.* 215.

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*Eschricht on the Diceras rude of Rudolphi.*—Several of these Entozoa were voided by the little girl of M. Grove, physician at Rænne in the island of Bornholm, some months since, and sent to Professor Eschricht for examination. He considers it to be truly one of the Entozoa, which may be or not adapted to Rudolphi's system, and describes it as being in every respect analogous to that described by Sultzer of Stras-

burgh in 1801, and by Dr. Lesauvage of Caen in 1818 (Bulletin de la Faculté de Medicine de Paris, tom. vi, p. 115). How is it, asks the author, that this worm, found but twice in large quantity, has not been met with more frequent, viz., near to Strasburgh in 1801, and on the Island of Bornholm in 1841? It is this which is very difficult to explain, especially by myself and others, who do not advocate spontaneous generation.—*December, p.* 355.

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*Necrology.*—In the December number of the Annales for the year 1841, will be found the biography of the late JEAN VICTOR AUDOUIN, and discourses on this much lamented and distinguished naturalist, by M.M. Serres, Chevreul, Milne Edwards, and Blanchard; to which is appended a chronological list of the zoological writings of this respected observer.

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*M. Edwards* has also detected in the interior of *Stephanomia prolifera*, with the assistance of a powerful microscope, an innumerable quantity of very active white corpuscles of a pyriform shape, and terminating in an extremely fine tail; the movements were in every respect those of spermatic animalcules, and it was impossible for him to consider them in any other light than true zoosperms. He likewise describes ovoid capsules, grouped near to the pyriform sacs, which he calls *testicles*, thereby endeavouring to show that these singular animals are provided with male organs.—*October, p.* 228.

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*Leon Dufour on the Metamorphoses of the Cecidomyia of the Sea Pine and Poplar.*—An interesting paper to the Entomologist, with several microscopic remarks.—*October, p.* 257.

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*Sars on the Development of Acalephæ (Medusa aurita and Cyanea capillata).*—The following are the most important results arrived at by the author connected with this class of animals:—1, Spherical eggs contained in ovaries, on which may be observed the vesicle of Purkinje, the spot (vesicule) of Wagner, and on which the *jaune* offers the division or ordinary bifurcation, give birth to young of an oval or cylindrical-oval form, furnished with vibratile cilia, contained during a certain period of their development in numerous receptacles, which form at the same time in the four arms surrounding the mouth of their parent.—2, Shortly, these young quit their parent, and swim for a certain time similar to Infusoria; they then soon fix themselves by one of their extremities to a foreign body, on which they grow, whilst at the other extremity they are free; a mouth is situated at the free end, and around this opening a row of tentacles is formed.—3, In this polypoid state, which may be considered that of a larva, these animals are capable of propagating by budding similar to Polyps, that is to say, by gemmæ and stolons: new animals produced by these means closely resemble the primitive larvæ.—4, Lastly, after an indeterminate space of time, the larva divides spon-

taneously into a number of transverse segments, all of which become new animals. The latter (not resembling the larvæ) are free, swim in every sense of the word, and have a disc-like body, the periphery of which is divided into eight bifurcated rays at their extremities; they have a quadrangular mouth, in the form of a pendent tube, &c. As they increase in size, the rays become shorter and shorter; in the mean time the intervals between the rays increase in extent, and give rise to marginal tentacles; to be brief, these animals become perfectly identical with their original parent (the *Medusa* or *Cyanea*). It is not then the larva or the individual developed in the egg, which becomes changed into the perfect Acalepha; but the small ones formed by the transverse and spontaneous division. This metamorphosis cannot be better compared than to the development of the *Salpa*, although offering many points of difference. The numerous observations of the author, made during last autumn, convinced him that Chamisso has given every necessary insight into their development. The *Salpæ* resemble the *Acalephæ*, in the particular, that it is not the larva, but the young of the larva which become perfect animals: it is not the individual, but the race is changed. The author, in conclusion, refers particularly to the observations of Graham Dalyell (Edin. Philos. Journ., Vol. XXI, 1836) as confirmatory in part of several of his observations.—*December, p.* 343.

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*Quatrefages on the Anatomy and Physiology of Synapta Duvernæa.*—The genus *Synapta* was established by Eschscholts for those Holothuridæ with very delicate integuments, deprived of respiratory organs, and possessing the property of adhering to foreign bodies in a similar manner to the heads of *Bardanus*. It has been adopted by Jæger and all succeeding naturalists. All the species of this genus hitherto known, have been discovered in the Red Sea, or in the seas of Asia and America. The presence then of these animals in our seas (the Islands of Chausey, and on the coasts of La Manche) is alone an interesting fact in Zoological Geography.

The portion of this memoir which, had it not been so lengthy, it was our intention to insert related particularly to the minute Anatomy and Physiology of this interesting animal; to proceed with order in the study of the several parts of the body of this *Synapta*, named by M. Quatrefages *S. Duvernæa*, we had intended examining them successively in the same order they are given in the original paper, viz.:—1st, the integuments,—2nd, the trunk,—3rd, the digestive apparatus,—4th, the organs of circulation,—5th, those of respiration,—6th and lastly, those of generation. We must, however, refer our readers to the original paper for the many interesting facts brought to light by the employment of the microscope when examining the several tissues of this animal, especially as we cannot conveniently give at present the numerous illustrations accompanying the memoir.—*January*, 1842, p. 19.

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*Remak on the Production of the Blood-globules.*—In the blood of chicks during the third week of artificial incubation, I found blood-corpuscles, some of which were round, some pear-shaped and stalked,

and some *biscuit*-shaped, with their large ends coloured red, and containing each a nucleus. These two nuclei were collected together by a thin process, which traversed the uncoloured and canal-shaped intermediate portion of the corpuscle. The nuclei of the stalked corpuscles also exhibited a process corresponding to the peduncle of the corpuscle. These observations, therefore, render it probable that in these instances an increase of the corpuscles is effected by means of *division*. The corpuscles of the embryos of pigs an inch long were four to six times larger than those of adult pigs; they exhibited double or quadruple nuclei, which probably belong to different divisions of the blood corpuscle marked by pale intermediate lines.

To observe the reproduction of the blood corpuscles after losses of blood; thirty pounds of blood were drawn from a horse, and a part of it when examined was found to contain besides the well known corpuscles without nuclei, only a few pale lymph-corpuscles, as they are called. On the following day the latter were found in enormous quantities and much enlarged; and in their interior they exhibited one or more pale reddish globules of the size of blood-corpuscles, covered by the granular contents. On succeeding days these globules appeared the more red the more the granular contents of the parent-cells (for such the pale lymph-corpuscles proved to be) diminished, and the thinner their membrane became. On the fourth day, there could be no doubt, that the red blood-corpuscles form within the enlarged pale cells, and become free by the disappearance of the latter. The blood of the horse became, as further experiments showed, the more coagulable, and the thickness of the buffy coat become the greater, the more blood was drawn; but the buffy coat in such a case consisted of but little coagulated fibrine, with an excessive quantity of the parent-cells of blood-globules.

I have confirmed these results in near about forty times. Between the fourth and eight days after the first considerable abstraction of blood, even during inflammatory and typhous diseases, the commencing regeneration of blood-corpuscles is seen in the appearance of parent cells, which, as in horses, in consequence of their low specific gravity, are chiefly found in the coagulum of the buffy coat, of which indeed they form a considerable part. My present investigations lead me to expect that I shall succeed in finding easily discernable physical differences between the buffy coats formed by an excess of parent cells, and those which consist chiefly of coagulated fibrine, and which are the results of the great specific gravity of the blood-corpuscles causing them to sink in slowly coagulating blood. I shall at present only say, that the looseness of the buffy coat is generally the consequence of an excess of new parent-cells. A buffy coat, which appears five days, or perhaps even a shorter time after the first bleeding, can never be a true sign of inflammation.

With respect to the production of the pale parent-cells, my present investigations render it probable that they are generated, not within the blood, but in the cells which line the walls of the blood-vessels and lymphatics, but experiments in which I am now occupied will determine this.—*Medicinische Zeitung. July* 7, 1841, *quoted in Brit. and For. Med. Rev. Jan.* 1842.

*On the Organs that Secrete the Perspiration.*—A letter was read from M. Giraldis, at the meeting of the Academy of Sciences, on the 16th August, 1841, on the glands secreting perspiration. After mentioning that they were first described by M. Breschet, in his pamphlet on the skin, and enumerating the different German authors that have taken notice of them in their works, he proceeds to state the situations in which they can best be seen. They are visible over all the skin, but are most numerous in the following places, viz., the palms of the hands, the soles of the feet, the armpits, and the mon veneris. They are not formed by tubes which divide at their extremity, but by a narrow canal, which penetrates the skin, and runs sometimes to a considerable distance in the fatty tissue beneath. At the extremities of the fingers, they appear entirely to cross it. They sometimes divide, but generally they are rolled upon themselves, forming little masses, which have been taken for the termination of the glandular structure. It is easy to see the tubes forming these little masses on a piece of skin properly prepared. Such is the kind of organ, according to M. Giraldis, in the human species, for the secretion of the perspiration, and which is analogous to the elementary glands of insects.

The general plan at present in use for examining the skin, viz., by removing from it all the fatty tissue, is one which must always lead to negative results, as the termination of the glands, always situated in that tissue, must of course be removed; another fatal mistake is the employment of too thin sections of skin, as the tubes are thus completely cut, and it must be by the greatest chance, if we can preserve in the same position the entire canal with its terminations. The skin ought to be prepared in the following manner:—The part should be taken from the palm of the hand, or sole of the foot, along with the fatty substance beneath it, and macerated for 24 hours in nitric acid diluted with two parts of water; it should then be removed, and macerated for the same length of time in pure water; a section of the thickness of a millimetre, should then be made, and subjected to a slight pressure between two plates of glass. The skin, thus prepared, becomes transparent, and the prolongations which line the canals, of a yellowish colour, thus making the tubes very distinct. By this way, we can examine the form of the papillæ, and the tissue which composes them.—*Abridged from the Gazette Medicale de Paris, Aug.* 21, 1841, *in Lond. and Edin. Month. Journ. Med. Soc., Nov.* 1841. *p.* 823.

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## PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

*May 26th,* 1842.—*Professor Lindley, President, in the Chair.*

The following communication, originally read before the Chemical Society on February 1st, 1842, was, at the request of the Council, laid before the Microscopical Society, as being likely to attract the attention of Microscopists to the field of Chemistry for research.

"*On the change of colour in the biniodide of Mercury.*"—By Robert Warington, Esq. The author after describing the method of preparation, and the well known change of colour which takes place when

the scarlet biniodide of mercury is subjected to the influence of heat and sublimed, and the passage of the yellow resulting crystals back to the original scarlet from various causes, details a series of most interesting microscopic observations on this subject from which he concludes that the resumption of the scarlet colour is owing to a series of changes taking place, which separate, to a certain extent, the laminæ of the crystals from each other, that this is determined more rapidly by mechanical disturbance of the surfaces from various enumerated causes, and that the yellow colour can be again produced, without materially altering the form, by carefully fusing together the separated plates of the altered crystals by a rapid application of heat. The author also states that when the heat is gradually applied a mixture of red and yellow crystals are produced, each having its proper and distinct form, but if suddenly submitted to a higher temperature, nothing but the yellow crystals result, proving that this compound is dimorphous, and has two distinct vapours at varying temperatures.

Mr. W. then goes on to investigate the changes of colour which take place when the biniodide is formed by precipitation from solutions, and finds that the yellow powder which at first appears, is in the form of the sublimed yellow crystals, and that these are after a short time redissolved slowly producing the formation of red crystals of the same shape as those obtained by the gentle application of heat to the dry compound; a phenomenon new in the subject of crystalization, and highly interesting. This paper was illustrated by drawings of the crystals taken from the microscope by the camera lucida. The powers employed were 250 and 620 diameters.

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## PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF DUBLIN.

*March 3rd*, 1842.—*J. F. Bergin, Esq., President, in the Chair.*

The Secretary having read the proceedings of the last meeting,

Mr. Allman read a very interesting paper on the reproduction of Entozoa.

Mr. Grubb exhibited a block of pine wood, which had formed part of a pile taken up from the bed of the Shannon, near Tarbert, where it had been lying for five years;—it was found penetrated by numerous tabular canals of *Teredo navalis*, and was rendered completely cellular by *Lemnoria*.

Mr Callwell presented some specimens of minute Algæ, *Calathamnium Corymbosa*, &c.

Dr. Hill exhibited several specimens of minute arterial injections of the human kidneys.

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*April 14th*, 1842.—*T. F. Bergin, Esq., President, in the Chair.*

The Minutes of last meeting having been read—

Mr. Callwell mentioned that he had obtained specimens of minute Algæ which had grown on a solution of Iodide of Potassium.

Mr. Bergin exhibited an instrument invented by him for the purpose of illuminating transparent objects, and promised a communication on the subject.

The Society was occupied during the remainder of the evening in testing the powers of Mr. Bergin's invention, and the result was deemed highly satisfactory.

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## Microscopical Memoranda.

*Kippist on the existence of Spiral Cells in the Seeds of Acanthaceæ.*—After briefly enumerating the other natural families in whose seeds spiral cells had been previously observed, the author proceeds to describe those of a plant brought from Upper Egypt by Mr. Holroyd (*Acanthodium spicatum*, Delile), whose peculiar appearance when placed under the microscope, first led him to examine those of other *Acanthaceæ*, in which family the existence of spiral cells had not been noticed. The entire surface of the seed in *Acanthodium* is covered with whitish hairs, which are appressed, and adhere closely to it in the dry state, being apparently glued together at their extremities. On being placed in water, these hairs are set free, and spread out on all sides, they are then seen to be clusters of from five to twenty spiral cells, which adhere firmly together in their lower portions while their upper parts are free, separating from the cluster at different heights, and expanding in all directions like plumes, forming a very beautiful microscopic object. The free portions of the cells readily unroll, exhibiting the spire formed of one, two, or occasionally of three fibres, which may sometimes be seen to branch, and not unfrequently break up into rings, Throughout the whole length of the cell the coils are nearly contiguous; in the lower part they are united by connecting fibrils, and towards the base of the adherent portion become completely reticulated. The testa is a semi-transparent membrane formed of nearly regular hexagonal cells, whose centre is occupied by an opaque mass of grumous matter. Those cells which surround the bases of the hairs are considerably elongated, and gradually tapering into transparent tubes, appear to occupy the interior of the spiral clusters. Some of these appearances were noticed by Delile, who described the *Acanthodium* in the splendid work on Egypt, published by the French Institute, where also a slightly magnified figure of the seed will be found, but without representing the spiral cells, which Delile does not appear to have detected.

Two species of *Blepharis* are mentioned as possessing a structure very similar to that of *Acanthodium spicatum*, differing chiefly in the smaller and more uniform diameter of the spiral cells, and in their thicker fibre, which is always single and loosely coiled.

The seed of *Ruellia formosa* on being placed in water developes from every part of its surface single short thick tapering tubes, within which in some cases a spiral fibre is loosely coiled; whilst in others the place of the spiral fibre is supplied by distant rings.

In the seeds of *Ruellia littoralis*, *Phaylopsis glutinosa*, and *Barleria*

*noctiflora*, the whole surface becomes covered with separate tubes, very similar in form, but destitute of spiral fibre, and terminating in a minute pore, from which streams of mucilage are discharged.

Those of several species of *Barleria*, *Lepidagathis*, &c. are entirely covered with long tapering simple hairs, which expand in water, and like the rest are enveloped in a thick coat of mucilage.

In all the foregoing species the hairs occupy the entire surface of the seed, and are usually directed towards its apex, though they occur often most abundantly at the edges; in others they are only found attached to a marginal ring of a different texture from the rest of the seed. This is the case in *Strobilanthus lupulina*, *Blechum Brownii*, and *Ruellia secunda*. The seeds of many plants of this family are wholly destitute both of spiral cells or of any other appendages possessing hygroscopic properties, such for example as *Acanthus mollis* and *ilicifolius*, *Dipteracanthus erectus*, and several species of *Justicia* and *Eranthemum*.—*Proc. Linn. Soc., March 17th*, 1840.

*Harrison on Longitudinal Striæ on Navicula Hippocampus.* — It is not generally known, and indeed it has been denied by some, that there exist longitudinal striæ in *Navicula Hippocampus*. In specimens of recent Infusoria collected by me at Hull, several of this species are met with, and the striæ can be distinctly seen with a power of about 400 linear, especially if not mounted in Canada Balsam.—*Robert Harrison, Hull, 6th of June*, 1841.

[We have examined the specimens sent by Mr. Harrison, and can with him affirm that *Navicula Hippocampus* is beautifully striated from end to end, at the same time among some of the specimens forwarded in his first letter, we must confess such markings are not invariably met with, and the lorica has every apppearance of not being so marked. Perhaps this might be a sufficient character to form a species or at least a variety upon.—*Editor.*]

*E. J. Quekett's observations on a certain Crystaline Matter found on the recently cut surfaces of the Wood of the Red Cedar.*—On the recently cut surfaces of the Wood of the Red Cedar (*Juniperus virginiana*) a crystaline matter is observed to form, which puts on the appearance of a mouldiness, but which, when viewed with a magnifying glass, is seen to consist of innumerable extremely minute crystals of an acicular form. The substance was observed to form on the duramen or heart-wood only, and not universally but in patches. It is easily volatilized by heat, and gives out the well-known odour of the wood. Mr. Quekett showed that the duramen of the red cedar contains an abundance of a concrete volatile oil, on which the peculiar odour depends, and that the crystaline substance is a compound formed between the air and the oil, for when the latter was obtained from the wood, and exposed to the action of the air, it was soon also found to be covered with the same acicular crystals. This substance, which possesses many of the properties of benzoic acid, Mr. Quekett considers new, and he proposed for it the name of *Cedarine*.—*Proc. Linn. Soc., March 3rd*, 1840.

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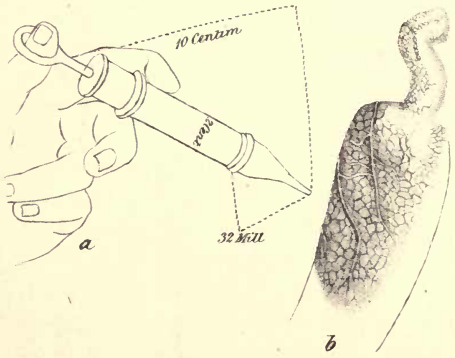


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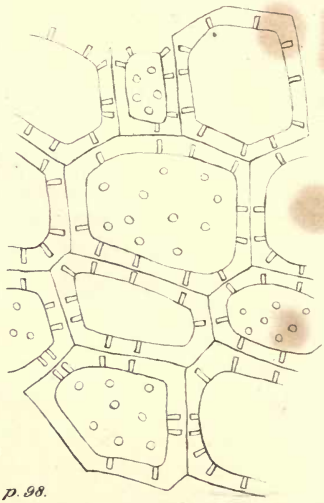

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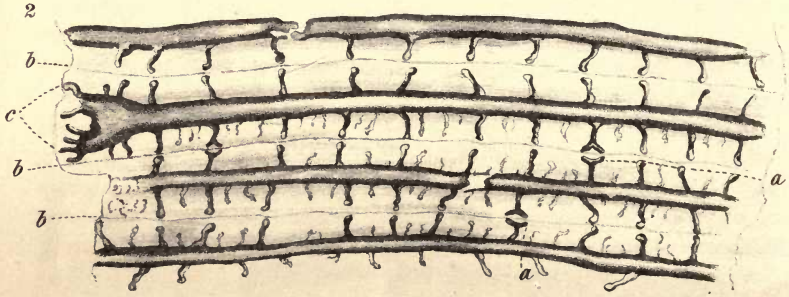


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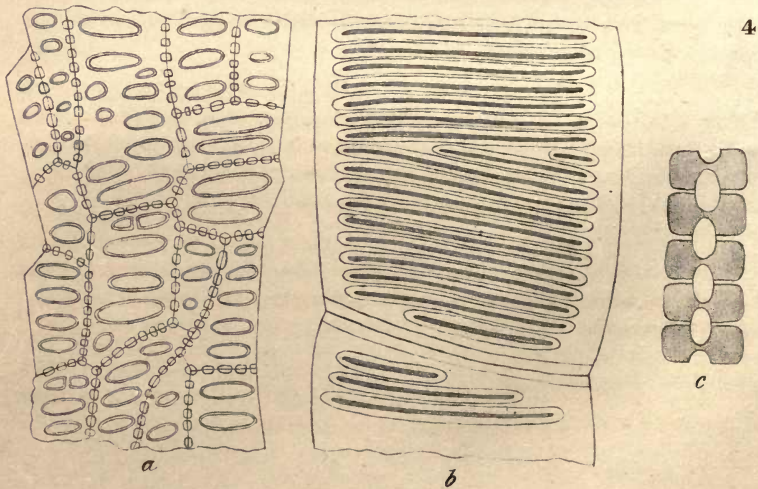


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J. Bayre, lithog.

## XXVI. — LETTER FROM M. RUSCONI TO PROFESSOR BRESCHET, ON A NEW METHOD OF INJECTING THE LYMPHATIC SYSTEM OF REPTILES.*

PROFESSOR COSTA handed to me a short time since the letter with which you have been kind enough to honour me. I am delighted to see you have undertaken, at my particular request, to make some researches on the lymphatic vessels of reptiles; this subject well deserves your attention, and I feel satisfied your investigations will tend to the advancement of science. You desire to know the anatomical process of which I make use, for injecting the lymphatic vessels of reptiles; I hasten to satisfy you :—

In my first letter, after having briefly shown the chief results obtained by my experiments, and having also shown the singular disposition of the arteries enclosed within the veins, I believe I stated that I employ a small syringe in place of the injecting tube of Walter, modified by Sœmmering, and a fluid coloured red or white in the place of mercury—but I have not at all directed attention to the small instrument I use, and which is most essential, it is a kind of trochar, of which the canula is formed from the quill of the wing feather of the quail or partridge, the trochar being a tolerably large sized needle of five or six centimetres in length, and of which the point has three facets. It is on this small instrument that the successful result of the operation most frequently depends : I also take great precaution to sharpen its point well upon a hone, and also that the anterior extremity of the tube is adapted exactly to the needle.

When I am desirous of filling with injection the lymphatic system of a lizard, salamander, or tortoise, I seize with a small pair of forceps the mesentery close to the vertebral column where the reservoir of the chyle is situated, and I introduce into it the point of the trochar, I then retain the quill and withdraw the needle from the tube—after having thus withdrawn it, and I think it necessary, the tube is pushed forward, taking great care that the reservoir of the chyle has not been injured in any other part.

This done I seize with the small forceps the quill, and introduce into it the small extremity of the syringe, and push the piston with a force always decreasing. It is by this process the arterial and venous systems

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* From the Annales des Sciences Naturelles.—February, 1842, p. iii.

are injected. When it is required to make a warm injection, the animal is placed in tepid water, and the injection is melted in a sand-bath. I do not dilate further on this subject, as I hasten to inform you that since my last letter, I have made some researches on other reptiles, and have found that land-tortoises, lizards, and snakes, are organized so far as regards the lymphatics, similarly to frogs and salamanders. In the snake I have seen a vein enclosed in a lymphatic vessel, but on this point I am not quite certain, not having at my disposal but two or three of those reptiles which were extremely small.

During the period of these researches it occurred to me to destroy the tortoises under observation by prussic acid. I was surprised to find them almost resist the poisonous action of this acid; I say almost, because the doses which caused the immediate death of a cock, cat, or a dog, do not sensibly affect them; so that to kill a tortoise of twelve centimetres in length, I have been obliged to inject into the stomach by the aid of a syringe, a dose of this poison which would have been more than sufficient to kill a horse, and after all it did not die until fifteen hours. But to return to the lymphatic vessels :—

When I announced to you the result of my observations on frogs and salamanders I was entirely ignorant that M. Weber, Professor of Anatomy at Leipsic, had inserted in Müller's Archives, 1835, an article on the hearts and lymphatic vessels of *Python tigris*. This observer has remarked that the lymphatics of this serpent are very large, and that the greater part of the arteries and even of the veins are enclosed in those vessels, but always separated from one another. He has observed that the aorta and its ramifications, even to the smallest, are enveloped in such a manner as to be bathed by the lymph : you see then that it is to M. Weber that the merit of the discovery of this fact is due, which entirely escaped the researches of Panizza.

One reflection occurs to me, and I cannot refrain from communicating it to you : M. E. Weber has made the dissection of but one reptile, the *Python tigris*, (which is seven feet long,) and he has enriched science with a very singular fact. Five years after I dissected a very small reptile in comparison, and I discovered the same fact. Panizza has dissected several land tortoises, but they were not sufficiently large for the experiments he had in view; he then procured several turtles. He has besides dissected many snakes, lizards, frogs, and salamanders, and in spite of all these opportunities, the fact of which I have spoken, altogether escaped his investigation. You will not be surprised at this when you recollect, that in all his experiments he employed the injecting tube of Walter and mercury. If he had made use of a syringe, and a

fluid coloured red or white, without doubt the fact of which we speak would not have escaped the notice of this anatomist.

In my researches on the common salamander, I will prove to you in the most manifest and positive manner, that Panizza is mistaken with regard to the lymphatic vessels of this reptile, and that he has fallen into error respecting the inferior or abdominal vena cava, of which he has misunderstood the direction and ramifications. I will further prove in the most incontestible manner, with the aid of drawings, made from nature, and placed side by side with his, that all the plates annexed to his work though drawn and engraved by a most talented artist, represent the lymphatic vessels entirely deformed, and that their deformity arises from Panizza having made use of mercury in his injections for demonstrating the lymphatic vessels.

*Pavia, Nov. 16th,* 1841.

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*Note on the above by M. G. Breschet.*

With this letter M. Rusconi forwarded two sketches, the description of which will be hereafter given, and several small dried anatomical preparations, made from reptiles of which he had injected the arteries and lymphatic vessels. These two orders of vessels can be distinctly observed; but the state of desiccation in which they were did not allow of their examination with sufficient surety and precision, to determine with exactness the relations of these vessels with each other. This examination can only be made in a rigorous manner upon fresh portions injected in the best possible manner, or on portions preserved in a liquid and equally well injected.

We have, with M. Rusconi, altogether abandoned the injection of lymphatics with tubes and mercury, on account of this metal rupturing frequently by its weight, the vessels and lymphatic reservoirs, the walls of which are very thin. This method is above all insufficient and even bad, when investigations are entered upon and the course and ramifications of the vessels not hitherto known. If one of the small canals be opened, the metal runs out, and it is not further possible to continue the researches.

I believe, with M. Rusconi, that the expansions (bosselures) or nodosities which the lymphatics possess at various parts, are principally due to the presence and to the weight of the mercury. In my injections with other substances besides the fluid mercury, the vessels are more regular in their outline and much resemble those of arteries; whilst, it

must be admitted, they are not altogether exempt at certain points from these dilatations rendering their surfaces unequal and undulating. In this relation, they may be compared to veins, which they resemble in many other points and of which they are perhaps but a modification. As it is, I have frequently recognized something analogous on veins, both on the trunks, and on the divisions of small calibre. My experience on this particular, has probably some value, for professional anatomists are not altogether unaware that I performed numerous experiments on veins, and that I commenced publishing the history of this important section of the vascular system, which I am in hopes of continuing at some future period.

M. Rusconi generously gives us his operative process for making injections of lymphatic vessels; at the same time he forgets to make us acquainted with the nature and composition of the matter he employs to distend the vessels. We will now give in a few words, with a view of supplying this deficiency, that which the talented zootomist has omitted to mention.

Independently of the substances mentioned in the Dissertation of M. Dumeril, or in the Manual of Anatomy by E. A. Lauth, we have frequently employed with success, milk, isinglass variously coloured either with vermillion, cochineal, chrome yellow, prussian blue, indigo, &c., or the alcoholic solution of gum-lac, coloured with the substances just alluded to. Spirit varnish, or spirit of turpentine, and sometimes diachylon plaster, made liquid by heat in a sand-bath, are all of them methods of which the anatomist may take advantage.

It has been for a long time observed that injections in which the colouring substance is in suspension, are, in many cases insufficient, because in the very small vessels, there is a separation between the vehicle and colouring principle. I desired then to possess a colouring substance soluble in water, oil, or alcohol; in short a soluble matter. I have discovered this colouring matter, it is that which chemistry affords abundantly to commerce, at a low price, and is extracted from campeachy, fernambouc, or sandal woods.

The colouring matter of campeachy wood easily dissolves in water and in alcohol; it is so penetrating that it becomes rapidly spread throughout the vascular networks. The sole inconvenience of this kind of injection is, that it cannot be made to distend any except the most delicate vessels, and that its ready penetration does not admit of distinguishing between arteries, veins, and lymphatics.

Lastly, there is another process of injection which we frequently employ, and which may be termed the chemical process. The process

most made use of in the Anatomical Laboratories of Paris, belongs to Dr. Doyere, who promises to be to zootomy one of its most distinguished observers. According to this process,* an aqueous solution of bi-chromate of potass is propelled into the vessels; after a short time, in the same manner and into the same vessel, an aqueous solution of acetate of lead is injected. This injection is made quite cold in a most easy and economical way, and the finest vascular networks are instantly coloured of a beautiful sulphur-yellow hue. I have also made several trials with a solution of caoutchouc, which gives great flexibility to the vessels.

*Explantion of the Figures, Plate* V, *Div.* 1.

Fig. *a.*—Represents the small Syringe used by M. Rusconi for his injections.

This instrument *should be made of silver;* it is ten centimetres long by two in diameter; its free extremity, which is received in the small tube, is conical, thirty-two millimetres long, and should be *made of gold.* This syringe has a ring on which the index or middle fingers rest, when the piston is about to be pushed forward. The end of the syringe, which is of gold, has very thin and at the same time resisting walls; the opening at the extremity should be as large as possible.

We cannot give here figures of the quills of the quail or partridge made use of by M. Rusconi. When it is required to inject the sanguiferous system of tadpoles or salamanders, the smallest tubes are used.

Fig. *b.*—Represents the lymphatic vessels of a portion of the rectum of a salamander, a continuation of the small intestines.—This drawing is a most faithful copy, drawn by M. Rusconi from an anatomical preparation, in which the lymphatics had been filled with a reddish coloured fluid, and the arteries distended by a substance of a white colour. On attentive examination of this figure, may be distinguished, by their white tint, the arteries in the centre of the lymphatics, and the branches (ramuscules) of these same lymphatic vessels.

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## XXVII.—ON THE MANUFACTURE OF GLASS FOR OPTICAL INSTRUMENTS.

Mr. A. Bourne of Chillicothe, Ohio, has addressed a letter to the Editors of the American Journal of Science and Arts, which is inserted at p. 207 of the number for January, 1841, in which after alluding to the decline of this art in proportion to the progress of the other arts in England, and to the results obtained by the Committee of the Royal Society of London in 1824, and the members of the Board of Longi-

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* For a more detailed account of this process, consult the Microscopic Journal, Vol. I, p. 156.

tude for the improvement of glass for optical purposes, and which committee appointed a sub-committee, consisting of Sir John Herschel, Mr. Dollond, and Dr. Faraday, who in the year 1834 reported progress, that they had succeeeded in making glass plates seven inches square, and eight tenths of an inch thick, tolerably free from bubbles and striæ, offers the subjoined questions for the consideration of men of science. Their glass (we repeat particulars for the sake of reference,) was a *silicated borate of lead*, composed of $104\frac{1}{4}$ parts of nitrate of lead, 24 parts of silicated lead, and 42 parts of borax; specific gravity 5.44, refractive index 1.8735, dispersive index 0.0703; and was not free from colour. This result, adds Mr. Bourne, does not appear to have been very satisfactory, and I have not heard of any further experiments or results.

Mr. B. then submits to the attention of men of science the following inquiries; the replies to which we shall be happy to insert in a future number should any of our correspondents think them worthy of their consideration:—

1. If we add a small quantity of lead to the materials of crown glass, so as to answer the purpose of a common crown glass lens of an object glass, and also add a larger portion of lead to the same materials, so as to answer the purpose of the common *flint* glass lens, will not these two kinds of glass have the same *character*, and produce spectra in which the several colours will be proportional, each to each?

2. If we add a very small quantity of lead to the other materials of flint glass, so as to answer the purpose of the *crown* glass lens, and also add a larger portion of lead to the same materials, so as to answer the purpose of the common flint glass lens, will not these two kinds of flint glass have the same *character*, and produce spectra in which the several colours will be proportional, each to each?

3. Can we use bismuth, or some metal other than lead, in the manufacture of transparent and colourless glass?*

4. As the inflexion of light by angular projections produces nearly the same dispersion that refraction does, and as the best of our polishing probably leaves the surface of glass rough and uneven, which would be obvious if we could see the ultimate atoms, may not a considerable

* We should presume that oxide of bismuth would give a yellow colour to glass, and it is quite doubtful whether we could impart any portion of the fluidity which belongs to the alloys of metallic bismuth to the compounds of its oxide with alkaline and earthy bases.—*Editors of Amer. Journ. Sc. & Arts.*

part of the dispersion be derived from the inflexion by the irregularly situated particles at the surface?

5. As the combination of bismuth with some other metals adds much to their fluidity in the melted state, would not the oxide of bismuth probably add much to the fluidity of glass in the melted state?

6. If we can render glass very fluid in the melted state, and cast lenses in finely polished moulds, is it not highly probable that the separate particles will arrange themselves by mutual attraction, much more regularly than the grinding and polishing can leave them? And may we not in this way hope to lessen the dispersion, or at least its irregularity?

Further, it is said that the alkalies render glass liable to a slow decomposition. If we could make transparent glass of alumina and bismuth, I have reason to believe that we should obtain great refractive power, very little dispersion, and great fluidity in the melted state, which are important desiderata; but it is highly probable that any combination with alumina would produce an opaque enamel. He concludes by saying that he has not heard of any experiments made for these specific purposes.

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## XXVIII.—ON THE STRUCTURE OF THE TISSUES OF CYCADEÆ.*

*By the late David Don, Esq., Professor of Botany, King's College, London.*

In *Coniferæ* the structure of the stem presents the ordinary appearance of dicotyledonous trees; the annual layers are distinctly marked, and there is a regular bipartition of each into wood and bark (liber); but in *Cycadeæ* no bipartition takes place of fibro-vascular bundles, which in in that respect resemble those of monocotyledonous plants, and the differences otherwise are very striking, *Cycas* having, besides a large central pith, several thick concentric alternating layers of cellular and fibro-vascular tissue; and in *Zamia* and *Encephalartos*, besides the pith, there are only two very thick layers, one of fibro-vascular, and the other, which is also the exterior one, of cellular tissue. The great peculiarity of the *Coniferæ*, and which distinguishes them as well from *Cycadeæ* as from every other family, is the remarkable uniformity of their woody

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* From the Proceedings of the Linnæan Society, 1840.

tissue, which consists of slender tubes, furnished on the sides parallel to the medulary rays with one or more rows of circular or angular dots; but in *Cycadeæ* no such uniformity is observable, their tissue, as in other phænogamous plants, consisting of two kinds of vessels, namely of slender transparent tubes, without dots or markings, and of dotted, reticulated, and spiral vessels, which are capable of being unrolled. The former are identical with the fibrous or woody tissue, whilst the latter, which form a part of each bundle, can only be compared to the strictly vascular tissue of other plants. These dotted vessels in *Cycadeæ* bear a considerable resemblance to the vessels of *Coniferæ*, and especially to those of *Dammara* and *Araucaria*, from the dots being disposed in rows, and confined to the two vertical sides of the vessel only, and they are moreover alternate, as in the two genera just mentioned. In *Cycadeæ*, however, the dots present much less regularity in number and size than in *Coniferæ*, not only in different vessels of the same bundle, but in different parts of the same vessel, forming one, two, three, four, and five rows; and they are not always confined to the vertical sides, but appear in some cases to follow the entire circle of the vessels. Their form is oblong or elliptical, in *Cycas revoluta*, *circinalis*, *glauca*, and *speciosa*, *Zamia furfuracea* and *pumila*, as well as in *Encephalartos horridus* and *spiralis*; but they are sometimes longer, narrower, and nearly linear, giving the vessel the appearance of being marked with transverse stripes. The vessels in all present so much similarity, that no generic distinction can be drawn from them. The dots are always arranged diagonally. The dotted vessels of *Zamia furfuracea* and *pumila* were observed to unroll spirally in the form of a band, presenting a striking resemblance to those of Ferns. The band was found to vary in breadth in different vessels, and was furnished with transverse rows, composed of two, three, or more dots. The coils followed the direction of the dots, and the unrolling was from right to left. In *Cycas revoluta* dotted vessels frequently occur with a single row of dots; but, from the circumstance of the dots on both sides being in view at the same time, they are liable to be mistaken as having a double row on each side. Besides the dotted vessels, there occurs throughout *Cycadeæ* another variety, differing but little from the ordinary spiral vessel, except in the tendency of the coils to unite. In some vessels the coils are free, and the fibre exhibits frequently, at intervals, bifurcations or narrow loops; in others, the coils unite at one or both sides, in which case the vessel presents a series either of rings or bars; and the fibre then is with difficulty unrolled, and it often breaks off into rings, or the bars separate at the point where the coils unite,

which is generally on the perpendicular sides of the vessel. In other cases the vessels are distinctly reticulated, and they then exhibit a striking analogy to the dotted cellules in *Cycas revoluta*. All these modifications are frequently to be observed in the same vessel in *Zamia furfuracea* and *pumila*, a fact which affords conclusive evidence of the accuracy of the theory advanced by Meyen, which refers the spiral, annular, reticulated, and dotted vessels to a common type. The dots and stripes are evidently the thinnest portions of the tube, being most probably parts of the primitive membrane remaining uncovered by the matter subsequently deposited on the walls.

The cellular tissue of *Cycadeæ* consists of tolerably regular parenchyma, composed of prismatic, six-sided cellules. In the species of *Zamia* and *Encephalartos*, so often referred to, the walls of the cellules appear to be of a uniform thickness and transparency, and destitute both of dots or marking; but in the adult fronds of *Cycas revoluta*, a different structure presents itself, for the walls of the cellules are furnished with numerous elliptical, obliquely transverse dots or spaces, where the membrane is so exceedingly delicate and transparent as to give the cellules the appearance of being perforated by holes, the intervening spaces being covered by incrustating matter, disposed in the form of confluent bands, which, when viewed under the microscope, resemble a kind of net-work. The dots or spaces uncovered by incrusting matter, are generally of a large size, and occur more particularly on the vertical sides of the cellules, a band usually running along the middle of the two opposite sides. The bands vary in breath, as do the dots, and they not unfrequently exhibit minute transparent points or spaces, where the solid matter forming the band shows a tendency to separate. The extreme delicacy and transparency of the dots or spaces of whatever size, appear fully to prove that they are parts of the primitive membrane of the cellule, which are uncovered by the incrusting matter. A solution of iodine will be found of great service in determining the actual existence of the membrane at those parts; for although it does not materially alter its colour, it tends very much to diminish its transparency and renders it distinctly visible, so as to leave no doubt that the spaces are not openings. The bands are evidently the result of a partial lignification; and indeed no better example can be offered than *Cycas revoluta* to illustrate and confirm the correctness of the views advanced by Schleiden as to the origin of the bands and fibres in the cellules and vessels of plants. Being anxious to ascertain whether the bands exist at an early period, the author had recourse to the examination of a young undeveloped frond, about two weeks old, and he was

much gratified by finding his previous suspicions fully confirmed: the cellules then being of a uniform transparency, presenting neither bands nor dots, but furnished with a distinct cytoblast or nucleus, which was found to have entirely disappeared from those cellules in which the incrusting matter was visible, proving that the incrusting matter is formed at the expense of the nucleus. The matter forming the bands is continuous, and is evidently not formed by a coalescing of spiral fibres, as some might suppose; for it is perfectly solid, and shows no disposition to unroll or to break up into fibres. The bands most probably originated form the shrinking up of the incrustating substance, which at first was equally diffused in a fluid state over the walls, and which, from the mere effects of consolidation, aided by the distension, and perhaps enlargement of the cellule, would naturally leave portions of the primitive membrane uncovered. That the dotted and reticulated vessels in *Cycadeæ* are of the same nature, and originate in a similar way as the cellules just described, there seems no reasonable ground to doubt. The parenchymatous cellules in *Cycas circinalis*, *glauca*, and *speciosa* resemble those of *Zamia* and *Encephalartos*, in having their walls of a nearly uniform thickness and transparency, being but rarely furnished with a few eliptical obliquely transverse spaces or dots. The cellules in *Cycas revoluta* vary both in size and structure, some being three or four times longer, whilst others are still longer and narrower, and furnished with more numerous and much smaller dots, which are not confined to the sides, but are disposed around the tube. These last, which have been observed also in *Cycas glauca* and *circinalis*, present an evident transition to the dotted vessels.

The whole of the *Cycadeæ* are supplied with numerous gummiferous canals, often of great length, and uniformly furnished with distinct cellular walls of considerable thickness, and which have been accurately described and figured by Professor Morren in a recent memoir.

Notwithstanding the analogies presented by their reproductive organs, the author considers the *Cycadeæ* as related to *Coniferæ* only in a remote degree, and that they constitute the remains of a class of plants which belonged to a former vegetation.

## XXIX.—REMARKS ON THE GLOBULES OF BLOOD.*

*By Dr. Henry Lambotte of Brussels.*

NOTWITHSTANDING the numerous published accounts of the blood-globules, by the greater number of physiologists who have followed Malpighi and Leuwenhoeck, it must be admitted that they far from agreed, even at the present day, as regards their history. There are two points above all which are interesting in a scientific point of view, and on which there are conflicting opinions: thus, some physiologists believe, that each blood-globule is formed of a small nucleus surrounded by a kind of envelope; others, on the contrary, regard these small bodies as altogether homogenous, where they are naturally situated, but susceptible of presenting a nucleus, when submitted to changes due to external causes.

The existence of this central nucleus, to which many physiologists assign a most important part, is then not only very uncertain, although it be admitted by great authorities, but others not less imposing, consider it a matter of doubt, or reject it altogether.

A second fact, equally controvertible, is that of the solubility of the globules in water.

I have made several observations, with a view to arrive at an opinion on this subject. I made use of a simple microscope, furnished with lenses of different powers, the greatest of which magnified from six to eight thousand diameters; that of from five to six hundred diameters was employed, and was quite sufficient to verify the principal facts. The reflecting mirror was plane.

If the light be bright, as when it impinges from a large extent of sky, the globules may be seen representing a mass of small grumous vesicles, very regular and clearly defined; they have a gelatinous aspect, are quite transparent, and have a slight yellow tint.

If the light be less intense, or if it falls on the reflector at a more limited degree, as, for example, through a window, then the globules are marked either with a deep point occupying the centre, or with a blackish ring, which is nearly concentrical to the border; but all the globules met with in the field of the microscope, do not present the

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* From the Bulletin de l'Academie Royale des Sciences et Belles Lettres de Bruxelles. Anné 1839. Tom. XVI. Part II. p. 130.

same aspect: thus, those grouped together at the side have generally a well defined circular line; those entirely isolated, do not often show where they are imperfect; on the margin of the field there are globules which exhibit this dark line well marked, and others where it is imperfectly visible. With very high powers, I have only observed rings, and never dark central points within the globules.

Every thing remains in the same state if the reflector be not moved, and if the slide be not removed further from the eye-piece; but when the reflector is turned gently either one way or the other, at the moment all the points or shaded rings may be observed to move and to change their appearance; for if the hand, or any other opaque body be passed between the window from whence the light enters, and the mirror which reflects the light upon the slide, the image of the hand or other body becomes evident in the globule; even if a small dark line or point be made on the mirror, the same may be observed, if viewed attentively, in each globule; but more, when the globules are attentively examined, it will be seen that in cautiously advancing and withdrawing the object towards the body of the instrument, there are nearly always some transparent globules of a more liquid character, in which may be traced the image of the bars of the window more or less distinct.

To form a correct idea of this phenomenon, and to be able to appreciate its character, it may be well seen in very small globules of grease; but care must be taken in placing these small corpuscules slightly out of focus, on account of the degree of refractive power of grease: here, in the globules of grease, the annular series becomes confounded with the the margin of the globules; but it must be remembered, that they are of a spherical form, and that the globules of blood are lenticular, which gives rise to that partially destroyed (caustique) appearance near the border of the latter. The same phenomena may also be seen in small globules of glass and bubbles of air; but modified by the different refractive power of these substances.

Lastly, it is easy to be convinced that the shady ring seen in the blood-globules under the microscope, is nearly always owing to an optical illusion, produced by surrounding objects: I say nearly always, because I do not pretend to assert that other causes might not give rise to the same illusion; as, for example, the depression which may be formed by the diminution (retrait) of a globule losing its volume, when the water with which it is impregnated evaporates. I do not further doubt, that it is impossible to produce a true central nucleus, when, for example, the surface of a globule absorbs the water in which it is placed to examine it, and presents in consequence, a different degree of refrac-

tive power in the central part to that which it does in the circumference or periphery.

As regards the question of the solubility or insolubility of the globules in water, it is surprising that it has for so long a time remained in dispute, and that so many difficulties have been brought forward to reconcile a fact, to all appearance so simple to verify. This diversity of opinion may probably be attributed to the means that have been employed in the endeavour to elucidate it. Thus, if blood be mixed with a small quantity of water, the water may dissolve a small part of the globular substance, and will be soon saturated; there will remain globules, which, although diminished in bulk, may have preserved a volume as large as before, by the absorption of water. If, on the contrary, too great a quantity of water be employed, the globules may disappear, either as the result of their limpidity, which is further increased in water, or because they are in reality dissolved.

But no doubt can remain, if the blood be operated upon in the following manner, in the way in which I did it: Spread on a piece of glass some drops of blood at the moment they are taken from the body, breathe immediately upon the glass; in a few moments the vapour of the breath condenses upon it, and the globules are dissolved in the liquid; there soon only remains on the glass a small quantity of reddish yellow fluid; this, when examined by the strongest power, does not exhibit the smallest globule, and has all the appearance of serum. This fact is very easily verified; but as it may be objected, that it is owing to the salts contained in the expired air, that the globular matter becomes dissolved, I convinced myself to the contrary by employing steam obtained from water heated from 35° to 40°: the result was the same; care must however be taken, that the temperature of the steam is not too high, as it would coagulate the globules, and render them insoluble.

I cannot pass over in silence a remark which necessarily ariscs from that which precedes; at the sitting of the 12th November, 1838, M. Askerson presented a memoir to the Academy of Sciences of Paris. (*Conjectures on the part performed by fatty bodies in the formation of layers of cellular tissue.*) Among the results arrived at by the author, was the following: *The globules or vesicles of blood are cellules which contain a fatty liquid; and it is their function to carry and to distribute this fluid everywhere, where the formation of cellules should take place.*

This fact would be very important, if it were true; but is it possible to believe, that if the blood-globules were fatty, that they would dissolve in water with such facility? On the other hand, is it so easy to con-

found fatty globules with blood-globules, when they are mixed, as is frequently seen in the body? It it is thus that in a woman, who died of erysipelas of the face, I found that the blood contained in the veins of this part, offered a great number of small fatty globules, which were readily recognisable by the property they possessed of refracting light, and by their greasing the surface of the slide on which they were placed; they did not dissolve when the breath was directed upon them, whilst the globules of blood rapidly disappeared when so treated.

From the facts I have related, I consider I am authorised in stating, that *the globules of the blood have no central nucleus, but are composed of corpuscules or small homogeneous masses completely soluble in water.*

[We have repeated the experiment above alluded to, but do not rest altogether satisfied with the results obtained by Dr. Lambotte. We do not question the enlargement and rupture of the blood-corpuscles by endosmosis, which evidently takes place when blood is so treated. As Dr. L. used a single lens of such high power, probably the transparent envelopes of the corpuscles could not be seen to such advantage as when they are viewed with a compound microscope, and with powers of acknowledged achromatic superiority. Our apology for inserting the above communication entire, must be the desire we entertain of recording the labours of Continental observers.]

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## XXX.—ON THE DEVELOPEMENT OF THE ANIMAL TISSUES.

*By Professor Müller.*

[Continued from page 83.]

Class III.—1. *Cartilages.*—Their structure and mode of development has already been described, (see page 80).

2. *The Teeth.*—The enamel of a tooth not yet fully formed retains the same form and structure after it has been treated with dilute acid. The inner surface of the enamel membrane which envelopes the crown of the tooth is formed of short hexagonal fibres, placed perpendicularly, so that each fibre of the enamel membrane corresponds to a fibre of the enamel. These fibres of the enamel membrane appear to be elongated cells. In the fresh state they contain a nucleus with nucleoli. Beneath these prismatic fibres of the enamel membrane is a layer of round cells which probably represent the primary condition of those fibres. The

true enamel fibres probably separate from the enamel membrane, coalesce with the enamel already formed, and at the same time become impregnated with calcareous salts. The substantia propria or ivory of the tooth is formed of fibres, between which the dental tubuli run. The pulp of the tooth at its surface consists of cylindrical cells which contain nuclei with nucleoli. The interior of the pulp is composed of round nucleated cells. Schwann conjectures that the fibres at the surface of the pulp are in successive layers added to and converted into the growing dental substance.

Class IV. 1. *Cellular Tissue.*—In the development of cellular tissue there first appears a structureless cytoblastema, in which round nucleated cells are subsequently formed. These cells become transformed into spindle-shaped bodies, which have in their interior, but attached to their wall, a round or oval nucleus, while this nucleus in its turn includes one or two dark points (nucleoli). These elongated cells become more and more drawn out at their extremities, and give off fibres, which are sometimes branched; and at length become resolved at each end into a fasciculus of extremely delicate fibrils. The division of the fibre-like prolongations of the cells into more minute fibrils gradually extends towards the centre of the cell, so that at a later period the fasciculus of fibrils proceeds immediately from the body of the cell. Lastly, the division into fibrils takes place even in the situation of the nucleus of the cell, and then the cell becomes wholly resolved into a fasciculus of fibres, upon which the nucleus lies. The fibres are probably tubular.

The cells of adipose tissue which are found even in the cellular tissue of the fœtus, present at first a distinct nucleus attached to their membranous wall. When the wall of the cell is thin, the nucleus forms a prominence above the surface of the fat globule contained in the cell. When the wall of the cell is thick, the nucleus is entirely included in its thickness. The nucleus contains one or two nucleoli. The fat cells in the cranium of a young fish (Plötze,) sometimes have each two nuclei which bear the same relation to the membranous wall of the cell. In the cellular tissue of the fœtus a third kind of cells is met with. These are round and pale; each has a nucleus with one or two nucleoli attached to their wall; they do not become elongated into fibres, contain no fat, but are filled with granules; and this deposit of granules is first formed about the nucleus.

The cellular tissue of the fœtus, when submitted to boiling, yields no gelatine; but in its place a substance which resembles pyine, except

in the particular that the turbidity produced in the solution by hydrochloric acid is removed by the addition of an excess of the acid.

2. *Tendinous Tissue.*—The fibres of tendinous tissue are formed from cells, in the same way as those of cellular tissue.

3. *Elastic Tissue.*—The middle coat of the arteries in embryo pigs, six inches in length, contains numerous isolated cells, some of which are globular, and some have an oblong form, while others give out two or more branching processes of various length. At the inner surface of the wall of each of these cells lies the usual nucleus with one or two nucleoli. In addition to the cells thus variously modified, fully developed elastic tissue is also present. The branching fibres of elastic tissue, which according to Purkinje, are hollow tubes, appear to be formed from the cells just described.

Class V.—In the development of the tissues of this class there are first formed independent cells, which either are round or cylindrical, or have a stellate form. In the former case the primary cells arrange themselves in longitudinal series, their walls coalesce at the points of contact, and the septa thus formed between the cavities of the different cells are subsequently absorbed, so that in place of several primary cells one secondary cell is produced. This secondary cell now continues to grow as the simple cells grow. In this way the fibres of muscles and nerves appear to be developed. In the case of the stellate primary cells the radiating processes of contiguous cells unite, and their walls becoming absorbed at the points of union, a network of communicating canals is formed. This seems to be the process by which capillaries are developed.

1. *Muscles.*—Valentin had observed that the primitive fasciculi (fibres) of muscles are formed by granules arranging themselves in a linear manner and coalescing; but that the primitive fibres (fibrillæ) are produced by the subsequent division of the primitive bundle. Schwann has remarked that the primitive fasciculi in the muscles of a fœtal pig, measuring three inches and a half in length, present a dark border—and a middle, more transparent part, probably a cavity. In this more transparent part he perceived, besides some small granules a series of larger oval flat bodies, which appeared to be the nuclei of cells, and frequently contained one or two smaller corpuscules—their nucleoli. These nuclei lay at pretty regular distances from each, in the thickness of the cylinder, but external to its axis. In muscles more advanced in development, the primitive fasciculi present no indication of a cavity; but the nuclei remain visible for a long period, frequently producing slight prominences on the surface of the cylinders. According to re-

cent observations of Rosenthal, the nuclei are still present in the muscular fibre of adult animals. The proper substance of the muscular fibres is produced by a deposit taking place within the tube. (The structureless sheath of the primitive muscular fasciculus, which I observed long since in insects, appears to be the remains of the tube formed by the united walls of the primitive cells.)

According to the late observations of Valentin,* there are first visible in the blastema of muscle nuclei with nucleoli, which soon become surrounded by extremely delicate cells. These cells assume an oblong figure and arrange themselves in linear forms like filaments of Confervæ. On the inner surface of the membranous walls of the tubes, or secondary cells formed by the coalescence of the primary cells, longitudinal striæ or fibres are deposited, while the septa dividing the tube into compartments are absorbed. The muscular fasciculus then has the form of a tube, with proportionally thick walls which are composed of perfectly transparent longitudinal fibrils. The nuclei of the primary cells are contained in the cavity of the tube.

[..... Mr. William Bowman's Observations "On the Minute Structure and Movements of Voluntary Muscles," read before the Royal Society, June 18th, 1840, not having been referred to by Professor Müller, we consider, now that we are detailing the labours of philosophers on this subject, we should be committing an act of injustice to this talented observer, did we not quote the abstract of his paper published in the Proceedings of the above named Society, and refer those of our readers still further interested in details, to the entire paper in the Philosophical Transactions for 1841, where the excellent illustrations bear out to the letter the facts brought forward : —

"The objects of the author, in this paper, are the following,—1st. To confirm, under some modifications, the view taken of the primitive fasciculi of voluntary muscles being composed of a solid bundle of fibrillæ. 2dly. To describe new parts entering into their composition. And 3dly. To detail new observations on the mechanism of voluntary motion.

"He first shows that the primitive fasciculi are not cylindrical, but polygonal threads ; their sides being more or less flattened where they are in contact with one another ; he next records, in a tabular form, the results of his examination of their size in the different divisions of the animal kingdom. It appears that the largest are met with in fish ; they

* Müller's Archiv., 1840, p. 179.

are smaller in reptiles, and their size continues to diminish in insects, in mammalia, and lastly, in birds, where they are the smallest of all. In all these instances, however, an extensive range of size is observable, not only in different species, but in the same animal, and even in the same muscle. He then shows that all the fibrillæ into which a primitive fasciculus may be split, are marked by alternate dark and light points, and that fibrillæ of this description exist throughout the whole thickness of the fasciculus; that the apposition of the segments of contiguous fibrillæ, so marked, must form transverse striæ, and that such transverse striæ do in fact exist throughout the whole interior of the fasciculus. He next inquires into the form of the segments composing the fibrillæ, and shows that their longitudinal adhesion constitutes *fibrillæ*, and their lateral adhesion *discs*, or plates, transverse to the length of the fasciculus; each disc being, therefore, composed of a single segment from every one of the fibrillæ. He shows that these discs always exist quite as unequivocally as the fibrillæ, and gives several examples and figures of a natural cleavage of the fasciculus into such discs. It follows that the transverse striæ are the edges, or focal sections of these discs. Several varieties in the striæ are then detailed, and the fact noticed that in all animals there is frequently more or less diversity in the number of striæ in a given space, not only on contiguous fasciculi, but also on the same fasciculus at different parts.

"The author then proceeds to describe a tubular membranaceous sheath, of the most exquisite delicacy and transparency, investing each fasciculus from end to end, and isolating it from all other parts; this sheath he terms *Sarcolemma*. Its existence and properties are shown by several modes of demonstration: and among others, by a specimen in which it is seen filled with parasitic worms (Trichinæ), which have removed all the fibrillæ. The adhesion of this sarcolemma to the outermost fibrillæ is explained.

"It is also shown that there exist in all voluntary muscles a number of minute *corpuscles* of definite form, which appear to be identical with, or at least analogous to the nuclei of the cells from which the development of the fasciculi has originally proceeded. These are shown to be analogous to similar bodies in the muscles of organic life, and in other organic structures.

"The author next describes his observations on the mode of union between tendon and muscle; that is, on the extremities of the primitive fasciculi. He shows that in fish and insects the tendinous fibrillæ become sometimes directly continuous with the extremities of the fasciculi, which are not taper, but have a perfect terminal disc. In other cases

the extremities are shown to be obliquely truncated, where the fasciculi are attached to surfaces not at right angles to their direction.

"Lastly. He states his opinion, and gives new facts on which it is founded, that in muscular contraction the discs of the fasciculi become approximated, flattened, and expanded; the fasciculi, of course, at the same time becoming shorter and thicker. He considers that in all contractions these phenomena occur; and he adduces arguments to show the improbability of the existence of any rugæ or zigzags as a condition of contracting fasciculi in the living body.—The paper is abundantly illustrated by drawings of microscopic appearances ....."]

2. *Nerves.*—Each entire nervous fibre is to be regarded as a secondary cell, formed by the coalescence of a series of primary nucleated cells. Schwann is of opinion that the white substance of the nervous fibre, which forms a tube around Remak's band-like axis of the fibre, or the cylindrical axis of Purkinje, is a secondary deposit on the inner surface of the membranous wall of the secondary cell. He finds that the white substance of each nervous fibre is invested externally by a peculiar structureless sheath like that of the primitive muscular fasciculi. This membranous sheath can be distinguished as a transparent border external to the opaque white substance of the fibre. Its defined outline is opposed, Schwann remarks, to the view of its being composed of cellular tissue. In perfectly formed nervous fibres Schwann sometimes perceived here and there at the side of the fibre a nucleus which lay included in the transparent border formed by the membranous sheath. In the grey nervous fibres no white substance is formed.

[In the substance of the brain of young embryos, Valentin observed cells, on the outer surface of which a granular mass was gradually deposited. These cells subsequently became nuclei; and their former nuclei became nucleoli; while the granular matter deposited around them formed the mass of the ganglionic globules, which were thus developed. Valentin has also observed, that after the development of nervous fibres, nuclei, elongated fibre cells, and fully developed fibres of cellular tissue are formed around them. *]

Schwann's discoveries are to be ranked amongst the most important steps by which the science of physiology has ever been advanced.

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* Compare Valentin's observations on the Development of Tissues in Wagner's Physiology, p. 132. [Willis's translation, p. 214.] Henle's observations on the Structure of the Tissues in his *Symbolæ ad Anatomiam* cet. Berol, 1837. Müller's Archiv., 1838, p. 102. Froriep's Notiz. n. 294.

They afford the basis for a general theory of vegetation and organization which it had hitherto been impossible to frame. Valuable observations had been made in all parts of physiology, and some branches of the science had been brought to a state of high perfection. But as regards the fundamental principles on which all should rest, these it must be confessed were either very unstable or entirely wanting, hence the slight connection which seemed to subsist between different important observations in parts of the science which were far advanced. These fundamental principles are now obtained. Schwann himself has pointed out with equal lucidity and acuteness, the general conclusions which are to be deduced from the observations of Schleiden and himself, and has framed from them a theory of the organization and vegetation of organized beings. It is not possible to give here more than the principal features of his theory.

There is one common mode of development observed in the formation of the most different elementary tissues of plants and animals, and that is the development from cells. In a pre-existing structureless substance, which may be situated either within or on the exterior of cells already formed, new cells are developed in a manner regulated by determinate laws, and these new cells undergo various modifications and transformations by which they are converted into the elementary organic tissues. In every tissue the new cells are formed only in those parts to which new nutritive matter has direct access. On this alone depends the difference subsisting between the vascular and non-vascular tissues. In the former the nutritive fluid, the liquor sanguinis, is distributed through every part of the tissues, and hence new cells are formed through its substance. In the non-vascular tissues, on the contrary, the nutritive fluid has access to one surface only, as in the case of the epidermis. Hence in cartilages, also, when they are destitute of vessels the new cells are formed only at their surface, or to a slight depth, namely, as far as the liquor sanguinis, their cytoblastema penetrates. The expression, growth by apposition, is correct, when understood to signify the development of new cells, and not the growth of those already existing; for in the epidermis new cells are formed only at the inferior surface of the membrane, whilst in the vascular tissues the new cells are developed in the whole substance of the tissue. In both cases, however, the cells themselves grow by intus-susception. Cartilage is at first destitute of vessels, and the new cells consequently are formed only in the vicinity of the external surface. But after vessels have extended into the medullary canals, the formation of new cytoblastema and new cells can proceed not only on the surface of the

bone, but also around each of these canals. This explains the structure of the cartilage of bone, the lamellæ of which are concentric, partly around the whole bone, and partly around the medullary canals. The process by which the primary cells are formed is the following. The cytoblastema, which is at first structureless or only finely granular, presents after a time round corpuscules. These corpuscules are in their earliest recognizable condition, the nuclei of cells, around which cells are subsequently to be developed. The nucleus is granular, and may be either solid or hollow. The part of the nucleus first formed is the nucleolus. Around this there is deposited a layer of fine granules. The nucleus thus formed increases in size, and then the cell is developed around it by the deposition of a layer of substance different from that of the surrounding cytoblastema. This layer has at first no defined outline; but when it has become consolidated into a membrane, it expands by the continued addition of new molecules in the interstices of the old ones. It thus becomes removed from the surface of the nucleus, which remains attached to one point of the wall of the cell. This formation of the cell around the nucleus is only a repetition on a larger scale of the process by which the nucleus was formed around the nucleolus. The membranous wall of the cell differs in its chemical properties in different kinds of cells, and even in the same cell it varies in chemical composition at different periods of its growth. Thus the walls of vegetable cells, when first formed, are, according to Schleiden, soluble in water, which is not the case with the cells which are perfectly developed. The matter contained in the cell varies in a still greater degree; for example, it is in one case fat, in another pigment. In a cell which is at first perfectly transparent, a granular deposit may gradually appear, its formation commencing around the nucleus; or, on the other hand, a granular deposit contained in a cell may be gradually dissolved.

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## Extracts and Abstracts from Foreign Journals.

[From the *Comptes Rendus*, 1841.]

*Flourens researches on the Development of Bones.*—In this Memoir the author treats on the general mechanism connected with the formation of Bones, and deduces, from the experiments quoted in detail, these three general conclusions;—1. There is in bone, a formative apparatus, which is the periosteum :—2. There is also an absorbing apparatus, viz.

the medullary membrane:—3. The medullary membrane or internal periosteum, is but a continuation of the external periosteum.—*Oct.* 4, 1841, *p.* 681.

*Biot* "On the influence of a Lamella-arrangement in the phenomena of Polarisation and Double Refraction, produced by different crystallised bodies."—31*st of May, and* 21*st of June*, 1841, *p.* 112.

[We quote the title of this and the following paper by way of reference for those of our readers interested in the laws of Optics.]

*Biot* "On the Optical Examination of a substance having the appearance of Natural Manna, and introduced as such in Commerce for Medicinal uses."—10*th of Jan*, 1842, *p.* 49.

*Laurent on the Return of the Monstrosities of the Hydra to a Normal State.*—He has confirmed that the several monstrosities of the *Hydra* about to produce young, never give birth to other monsters, and that the offspring are normal individuals. He has equally determined the various physiological conditions by means of which they can prolong the monster state, or favour the natural tendency of several of these monsters to return towards their normal form.—21*st of June*, 1841, *p.* 1171.

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*Bouchardat on the Theory of Buds, and the Existence of Rhyzogènes.*—In this memoir the author passed successively in review the various circumstances which may favour or retard the development of roots, when stems are immersed in water; he exhibited by experiment the influence of light, heat, that of certain acids mixed in different proportions with the liquid; he examined the conditions of evolution of the roots which depend on the state of the stem and those belonging naturally to the plant, and lastly observed the changes produced in the organs of a branch placed in those circumstances capable of giving rise to buds.

When a leaf-bearing stem deprived of its root is placed in a vessel filled with water, the green parts remain turgid frequently for a very long period, but without evincing any appreciable growth. The water first penetrates at the cut end, but this diffuse and irregular passage does not fail to be interrupted, at least in a great part, by the death of the extremity of the stem. There exists, however, organs which by an isolated kind of development can supply to the defect of absorption resulting from this alteration; these are the *lenticels*, organs irregularly dispersed on the bark, and having no communication with the interior of the stem. These lenticels, essentially composed of cellular tissue, enlarge on immersion in the fluid, project considerably, and finally become organs of absorption, denominated by M. Bouchardat *caulinear spongioles;* they are then seen under the form of white tubercular masses, sometimes elongating as true roots, but they may be always distinguished from such in this stage of growth, by never having any direct connection except with the external part of the bark.

When the caulinear spongioles are developed on a stem, its preservation in pure water may be relied on for an indefinite length of time; but its growth is none or inappreciable, for these are not the normal organs of absorption. It is not the same even with the absorption which operates by means of the development of special organs, at first confounded with lenticels, but which, according to the observations of M. Bouchardat, are essentially distinct. Considering these latter organs as the true root-buds, he has given them the name of *Rhyzogènes*.

"At first," says he, "the *Rhyzogènes* and *Lenticels* might be confounded; nevertheless a little attention will render evident the fact that whilst the latter are distributed without order on the bark, the others have a regular mode of distribution. Further, lenticels are flat, or very slightly swollen; rhyzogènes, on the contrary form conical protuberances; lastly, microscopical examination shows, that whilst the lenticels are as before stated essentially composed of cellular tissue, and solely in connection with the external part of the bark—rhyzogènes are formed of a number of vessels and cellular tissues and have an evident communication with the woody axis. The preservation of the green parts of a branch may be the result of a simple development of the caulinear spongioles, as above stated; but it is only by the growth of rhyzogènes that a true increase of structure can take place."

The portions of the lower part of the stem at the point where the rhyzogènes are developed, have given rise to true roots, modified according to a particular manner, and the study of the changes presented, appears to M. Bouchardat, to be able to furnish a new argument in favour of the theory of M. Du Petit Thouars, on the mode of growth of plants.

For the Science of Botany properly speaking, the consideration of rhyzogènes, has also according to the author, a certain importance, and may be able to furnish good characters for distinguishing one from the other in nearly allied species.—21*st of June*, 1841, *p.* 1172.

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[From *Valentin's Repertorium*, 1841.]

*Valentin on Parasites in the Bladder of the Frog.*—In spring and summer I found a great number of parasitical animals within the urinary bladder of the frog, which probably represented transitional conditions between the Infusorial-like creatures and *Distoma cygnoides* observed by Miescher in the same viscus. At their anterior extremity they possessed a large excavation, becoming narrower posteriorly, at the bottom of which was an opening, having two distinct marginal lines, and surrounded by radiating folds. Behind this, on the external surface of the body, was a wreath of cilia, which in the live animal was in active motion, but in the dying creature moved but slightly, and in a pulsating or rythmical manner. By means of these organs the parasite moved itself in a circle, without exerting any great locomotive action. Through the opening at the bottom of the discoid excavation, a smaller, though yet a *comparatively* large and round body might be observed, which, when

viewed laterally, appeared as if placed in the posterior portion of the body; and here also might be seen sometimes two or more vesicular bodies. In the dying or dead animal, a sinuous tube, having an enlarged extremity, was to be observed, which was probably an intestinal canal. In the interior of the body was an apparatus of cilia, though it was not always very distinctly seen. The internal large bladder was sometimes so much distended, that it covered a great portion of the other organs. Besides these, numerous small granules, varying from each other very much in size, were seen internally. Remarkably enough, the neighbouring intestine of the frog, did not contain any of these animals, but an immense number of Infusorial creatures, and a *Filaria*. A single specimen was found near the liver.

*Negrier on the connection of Menstruation with the Graafian Vesicle.*—Menstruation, according to the author, is connected with a periodical bursting of a Graafian vesicle in the ovarium. In the new-born female there are only to be found rudiments of follicles; about the 12th year, a grey matter is observed within the follical coverings, which soon becomes hardened. At puberty the interior of the follicle becomes yellow, and the follicle itself is now more vascular. At the first menstrual period, a follicle swells, and bursts at its peritoneal surface. This is repeated at each menstruation, and ceases at the time when the uterine discharge stops.

*Grübe on the Menstrual Blood.*—Besides want of coagulating power, and the presence of much albumen, with diminished quantity of fibrine, the menstrual blood is characterised by the altered condition of the true blood-globules, which are often notched and crumbled.

*Storer and Valentin on the Spawn of Syngnathus.*—Storer has observed abundance of spawn in the male Syngnathus, which decidedly receives the eggs from the female. Valentin remarks since the confirmation of the opinion of Rathke, that the female bears the spawn, I have several times examined, under the microscope, the organs, or at any rate what was analogous to them, mentioned by Rathke, taken from specimens preserved in spirits, belonging to the species S. pelagius, Ophidion, and Rondeletii, and have seen the elements of the egg in the generative organs. On the other hand, in a fresh Syngnathus, provided with spawn, which was obtained at Nizza, the genitals appeared perfectly white, and only exhibited, under the microscope, granular bodies, so that even after a microscopical examination, I could not say to which gender the creature belonged.

*Langenbeck on Medullary Sarcoma.*—The femoral artery of a dog was opened, and some blood drawn off; this being freed from its fibrine, was mixed with the soft matter of a medullary sarcomatous tumour of the humerus, and injected into the artery; the diseased limb had been amputated two hours and a half previously, and was not quite cold. In nine weeks time there were found two or three light-blue circular and

flattened swellings upon the anterior surfaces of the upper portions of the right and left lungs, and which were like carcinoma of these organs in man. In the substance of the central portion of the left lung was a hard circumscribed tumour, about the size of a bean; the portions of the lung surrounding were normal in character. This tumour presented on a dissection the characters of a carcinomatous tubercle. Under the microscope the numerous red points in it were seen to be convoluted capillary vessels. The substance of the tumour itself consisted of strong fibres of the thickness of the primitive muscular fibres, having between them closely placed cells of $\frac{1}{100}$th‴ in diameter. In the fluid got from the tumour by pressure, were found small cells about the size of the blood-globules, besides some still smaller cells of oil-globules. These identical microscopic elements were found in the medullary sarcoma of the humerus.

*Erdl on the Kidnies of Helix Algira.*—Between the delicate vessels of the vascular net-work met with in the urinary glands of Helix Algira, are spaces containing round or elongated cells, apparently seated on these minute vessels; these cells sometimes contain a nucleus, at other times are empty. This nucleus increases in size, finally becoming as large as the mother cell, and then becomes freed from the net-work of vessels, remaining free in the kidney; at length it passes off by the excretory duct of the organ.

*Simon on the Structure of Warts.*—The common warts met with on the integuments of the hand, consist of papillose elongations of the corium, which appear as delicate, closely-packed fibres, covered by the upper skin. Warts with peduncles contain soft cellular tissue, and often fat. Both kinds are to be met with in the domesticated mammalia.

*Valentin on Hair.*—Near the unhurt points of hair which has not been cut, as for example, in the hair of the mons veneris, the forms under which the transverse lines are seen, indicate that here delicate epidermoid scales are placed upon each other like tiles. By the use of sulphuric acid, however, which is a very good re-agent for this investigation, the matter becomes plainer. The very thin scaly pieces which appear to be placed in a double and opposed direction around the longitudinal axis of the hair, separate from each other, very often in a regular manner, so that the surface of the hair appears as if symetrically tessalated by their fibres. Since these little scales near their free margins exhibit some portion of their surface, they appear like fibres, whose separated edge or place where the connection is broken evinces their true nature, viz.—elongated scales void of nucleus. By this structure hair approaches only the formation of horn, since in horn got from the ox, large scales will separate from it with the use of any re-agent. After making use of the sulphuric acid, the apparently fibrous horny substance is seen to consist of scales. These scales, as well as horn and epidermis, have no visible nuclei. I should be therefore inclined to reduce all the apparently fibrous substance to such scales. In dif-

ferent hair they are more coloured or devoid of colour, or have long pigment cells.

*Della Chiaje on the appendages of the Kidnies in Fishes and Reptiles.*—In *Ammocœtis branchialis* and *Petromyzon fluviatilis*, they are placed on the outer margin of the gland, near the ureter and the fatty bodies. In *Petromyzon marinus* they cover the outer surface of the kidney, and in *Accipenser sturio* and *A. muræna* they appear as round yellow bodies incorporated with the parenchyma of the same. In *Torpedo electrica, T. galvanii, Squalus centrina*, and *C. acanthias*, they constitute a semilunar yellow granulated mass about the size of a large bean at the base of the left portion of the kidney. In *Raja rubus* and *R. batis*, they lie in the form of a Y along the middle line between the glands.

The greatest development occurs in *Squalus acanthias* and *S. mustelus*. In the *flat tailed Salamander*, along the edge of each kidney are seen a row of round yellowish bodies composed of glandular acini. *Rana esculenta* has in the middle of the under surface of the organ small yellow glands composed of minute ramified vessels, and which are also found in the *green* and the *common Toad*. These appendages of the kidnies receive their arteries from the Aorta and four large veins from the Vena cava.

*Valentin's remarks on Trichina spiralis.* (Vide page 147 of the Microscopic Journal.)—In specimens which have been preserved in spirit I have not only observed the granular matter in the two poles of the outer cyst, but also in the narrow space which appears to exist between the outer and inner cyst and connecting as it were the two poles on all sides. The outer cyst is probably a true organized envelope, whilst the granules are rich in inorganic salts. If the cysts are acted on by weak caustic bicarbonate of Potassa, the walls of the outer cyst appear as a narrow bright stripe, whilst the granules remain dark. After being acted on by Hydro-chloric acid, carbonic acid is evolved and all becomes brighter and more transparent. In the latter case the skin of the inner cyst sometimes exhibits concentric lines which, perhaps, indicate its origin from concentric layers. The intestine and longitudinal thread are distinctly visible in the preserved specimens. At the anterior obtuse rounded extremity I several times observed an oval cavity, which was probably the oral aperture alluded to by Owen and Wormald.

The granular organ described by Farre and Bischoff, and which appears to me a very doubtful ovarium, I could not discern in the preserved specimens. Only once did I see it as a bright granular spot after the action of the Hydro-chloric acid.

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[From *Schlechtendal's Linnæa*, 1842.]

*Bange on the Seed of Pugionium cornutum.*—That the outer covering of the seed cannot be an arillus is evident enough if this plant is regarded as a member of the Cruciferæ. It must, therefore, be one of

the proper coats of the seed, and regarded as an "integumentum exterius" since there exists beneath it an "integumentum simplex membranaceum." We do not find any where amongst the Cruciferæ a semblance to this, or at the most a delicate epidermis lying closely upon the testa, which sometimes spreads out at its margin in a winged manner. Besides, within this covering which loosely envelopes the seed we find the umbilical cord, and which cannot be in the least compared with a raphe. Further who ever observed in a ripe seed of the Cruciferæ an "Embryo gramineo-viridis." The thickening of the radicle near its extremity, is a condition which as far as I know is found in no Cruciferous plant.

Pugionium must be removed from the Cruciferæ, it belongs to the family Chenopodeæ.

*Bange on the Seed of Dipterygium glaucum.*—This plant is not one of the Cruciferæ but belongs to the tribe Capparideæ. This view I adopt from the presence of an albumen enclosing the embryo as it does in Capparideæ, this was described by Decandolle as an "Endopleura tumida," whilst others have wrongly denied the presence of an albumen.

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[From *Oken's Isis, Heft* 3, 1842.]

*Meyer on the Anatomy of the Entozoa.*—The indefatigable author has here given us very full and able dissections of the intestinal worms, the internal structure of which has hitherto not been sufficiently known.

*Trichocephalus dispar* from the Cæcum is first described, and drawn highly magnified both male and female on tables 1 and 2. The intestinal tube is fully represented with the oral and anal apertures, as also the seminal vessel with the *ruthe* near the anal opening. The female organs are also equally well shown. The oviduct is exceedingly long, commencing posteriorly near the anal orifice, then running as far as the stomach and turning back again to the anus it proceeds once more close to the stomach where it opens in the middle third of the body. The ova are drawn highly magnified.

*Oxyuris ambigua* both male and female, and the male of *O. acuminata* are represented on table 3. The opening of the seminal canal is near the anus, just before the point of the tail, that of the female is further forward. The male and female organs of *Distoma appendiculatum* are well developed in table 3, fig. 12, and the same may be said of *D. cylindricum*, table 3, fig. 13.

The dissections of *Octobothrium lanceolatum* call for especial praise, four pair of suckers are drawn posteriorly, two anteriorly near the mouth, behind these one with ten teeth where the male and female canals open; the stomach is double and blind, and runs backwards, the ovi-sac especially is very large, the seminal duct contains large seminal capsules, which are also drawn highly magnified.

No circulating apparatus is to be seen, and that which Nordmann took for the circulation in *Diptozoon* was but the movement of cilia.

[From the *Gazette des Hopitaux*, 1842.]

*M. Borjery on the Microscopic Anatomy of the Spleen in Man and the Mammifera.*—From the anatomical structure of the spleen, and the appearance of the fluid contained in its vesicles as shown by the microscope, the following propositions may be advanced respecting the functions of this organ: these propositions although not *positively* indicating the whole service of the spleen, point out the path to its determination.

1st. The spleen appears to be an organ of sanguineous elaboration and consists of two different structures.

*a.* A secretory vesicular apparatus operating directly on the arterial blood, the product which is absorbed by the veins being only a preparatory step towards another elaboration. This should have its seat in the liver, where the splenic fluid is carried along with the venous blood of the digestive organs.

*b.* A lymphatic apparatus on the one hand, acting on the blood furnished to it by the numerous little glandular arteries, and on the other on the fluid residues of the elaboration of the vesicular apparatus, conveyed to it by the lymphatics.

2dly. These two portions or structures do not appear to be connected anatomically, and juxtaposed organule to organule, save in the point of exercising a common function. The venous residues of the two portions go equally to the Liver, whilst the mere residue of the lymphatic glands is transported in the apparatus of the same name.

3rdly. The analogy of texture between the spleen and the lymphatic glands though not affording evident proof, admits of the legitimate assumption that these two organs can up to a certain point supply the place of each other, and which explains the want of fatality when the former is extirpated.

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*Ehrenberg on the Perception of the Smallest Bright Bodies.*—On pressing small globules of quicksilver on a glass micrometer, he easily obtained smaller globules of $\frac{1}{100}$th to $\frac{1}{2000}$th of a line in diameter. In the sunshine he could only discern the reflection of light, and the existence of such globules as were $\frac{1}{300}$th of a line in diameter with the naked eye; smaller ones did not affect his eye either in sunshine or with a Chevalier's reverberatory lamp. He however remarked, at the same time, that the actual bright part of the globule did not amount to more than $\frac{1}{900}$th of a line in diameter. Spider-threads of $\frac{1}{2000}'''$ in diameter were still discernible from their lustre.—*Poggendorff's Annalen, in Taylor's Scientific Memoirs, Vol.* I, *p.* 583.

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*Pappenheim on the Ligament of the Velum Palati.* — It is easy to see with the naked eye that there is a white streak on the anterior median

line of the velum, which takes its origin from the lowest extremity of the uvula, dividing the velum into two equal halves, and proceeds to the membrane of the hard palate, where, though it grows thinner, it may be traced to the upper incisor tooth. On the posterior median line of the velum this streak, though less distinct, yet in like manner proceeds from the uvula to the posterior nasal spine. The microscope shows that it consists of large and chiefly longitudinal fasciculi of strong elastic fibres which are traversed by only a few blood vessels and nerves, and which spread out on either side of the median line of the velum, beneath its mucous membrane, towards the tonsils. It is observable that the middle portion is favourable to the considerable power of contraction which the uvula possesses in the longitudinal direction, and the lateral fibres to the mobility of the whole velum.

The streak to which, only for the sake of indicating its independent existence, Dr. Pappenheim gives the name of *ligamentum uvulæ*, occurs as well in tender children as in adults, and sometimes splits anteriorly into two halves. — *Medicinische Zeitung, July 14th,* 1841.—*Quoted in Brit. and For. Med. Rev., January,* 1842.

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*Bischoff on the Microscopic Examination of Lymph.*—The fluid examined was taken from two large lymphatics in the neck of a dog. It was quite clear and pellucid, and after some time coagulated, but without assuming a reddish colour. It contained some yellow glistening globules of no great size, having an average diameter of from $\frac{3}{10000}$ths to $\frac{2}{10000}$ths of a Paris inch, the largest being $\frac{4}{10000}$ths, the smallest $\frac{2}{10000}$ths. A nucleus and envelope could not be distinguished in them. They were not all quite round like the blood-globules ; nor were they granular and nodulated. They were not altered by water, acetic acid, or ether ; but in caustic potash they vanished immediately. Similar globules with the same reactions present themselves, together with innumerable very small granules in the white contents of the thoracic duct and in the chyle.—*Müller's Archiv.*, 1839. *In Dr. Forbes' Medical Review, Oct.* 1841.

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## PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

*June 22nd,* 1842.—*Professor Lindley, President, in the Chair.*

A Paper was read by Dr. Arthur Farre "On the minute structure of certain substances expelled from the Human Intestine, having the ordinary appearance of shreds of false membrane, but consisting entirely of confervoid filaments probably belonging to the genus Oscillatoria." The author stated that these substances had been passed by a patient, a middle-aged female, who had suffered lately slight indisposition, but in whose symptoms there was nothing remarkable except that for twelve hours before the passage of these shreds considerable pain and

uneasiness had been felt in the abdomen; unaccompanied, however, by any evidence of inflammation. The substance passed had so much the appearance of shreds of false membrane as to be easily mistaken for them. They were of a buff colour and varied in consistence, some portions being loose and rather flocculent, with a villous surface; others smooth, shining, and membranaceous. They had a peculiar elasticity, and the membraneous portion when torn had a clear edge. These latter also presented a fibrous appearance to the naked eye, the fibres crossing at right-angles. When portions of this substance were examined under the microscope with a power of from 50 to 100 linear, they were seen to consist entirely of extremely delicate filaments, appearing like a mass of conferva. The looser portions had the usual tangled appearance of a mass of conferva, but in the more membranous flakes the cross-arrangement of the filaments was very evident. Examined with a power of from 300 to 500 linear, the filaments appeared of a pale green colour, and most of them exhibited the cross lines which mark their division into cells, as in *Oscillatoria* and other allied genera. The filaments were of nearly uniform size, measuring the $\frac{1}{7000}$th of an inch in diameter, but of indefinite length. At their extremities many terminated abruptly being evidently broken across at a joint. Others were attenuated, being apparently the growing ends, while others had an appearance of branching dichotomously, which circumstance was to be explained, either by supposing that the filaments split longitudinally as well as transversly, which many of them had an appearance of doing, or else which is probably the true explanation, that the branches were overlying and united in part, while the extremities remained free. This union of the filaments in portions of their length was so firm in most instances as to resist separation when the parts were put upon the stretch. It was probably of the same nature as the union which takes place in *Zygnema*, but the filaments were too delicate to afford an opportunity of ascertaining the precise mode in which it is effected. It was observed very frequently to occur among the filaments, and gave to many of them the appearance of a dichotomous termination. The author was inclined to refer this singular production to the genus *Oscillatoria*, of which it appears to constitute a new species; but further investigation may show it to belong to a new genus. There was nothing in the history of the case to show the source from which it had been derived. The patient drank of the ordinary water which supplies London; but supposing the reproductive sporules to have been thus imbibed, they may have become so far altered in character during growth, deriving their supplies from an organized surface and thus becoming converted into an animalized material, as to exhibit a new and unknown appearance. The author concluded by referring to parallel instances of growths from various parts of the bodies of man and animals as discovered by modern microscopic investigations, but considered the fact now communicated as in itself new to science.

## Bibliographical Notice.

*Geology for Beginners. By G. F. Richardson, F.G.S. Of the British Museum, 8vo. pp.* 530, *London.* Bailliére and Co.

The author of this publication will be remembered by many of our readers as having furnished translations of several articles from the German on subjects of scientific interest, which have appeared in our pages. We have, therefore, peculiar pleasure in confirming the opinion both of the general and scientific press in favour of the publication, and in congratulating our esteemed correspondent on having produced a work in the highest degree meritorious and useful. Though designed ostensibly for beginners, it is calculated to afford information to the proficient, and even the experienced Geologist may derive instruction from a work so extensive in its plan, and we must add so successful in its execution. Justly conceiving that many of the treatises previously published assumed a degree of knowledge on the part of the student which was not always possessed, and knowing in fact that Geology is but another name for the knowledge of some half dozen sciences which pass under that general term, he has furnished a separate treatise on each, and the "beginner" may here meet with instruction on the varied and interesting subjects of Mineralogy, Physical Geology, Fossil Conchology, Fossil Botany, and Palæontology, with a sketch of the history of the Science, a vindication of its utility and importance, &c., history of the various formations, including directions for collecting and describing fossils, and generally pursuing the study. It is obvious that a work embracing such a variety of themes, must possess powerful and varied claims on public patronage; and we are by no means surprised at the eulogies which it has received from the public press, and the rapidity and extent of its sale. We must not omit to mention that among its varied dissertations the value and importance of microscopic investigation are especially enforced, and information of instructive nature imparted. We have noticed some imperfections, such as the too great prolixity of some chapters, contrasted with the brevity of others, together with some of those incidental faults unavoidable perhaps in a work of so extensive a character. They may be remedied in a second edition, and we doubt not the publication will reach many.

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## Microscopical Memoranda.

*On the occurrence of the Nest? of an Insect on the Human Hair.*—On examining some human hair with the microscope, I was somewhat surprised to observe a small elongated cup-shaped nest, of a white colour and much resembling, when viewed with the naked eye, a scale of epithelium. It was situated within a quarter of an inch of

the bulb of the hair, and projected from one side; its form resembled that of the calyptra or cup of a moss—there was a decided opening at the apex, which was furnished with a well defined rim or margin; the orifice was filled with a number of small oval or roundish particles resembling eggs—these were piled one above the other in a conical manner. The whole interior appeared filled with similar bodies, which were easily recognisable through the diaphanous parietes of the receptacle. The nest, should such it be, was attached by means of a prolongation of its lower part, which encircled the hair, much in the same manner as wasps and some birds fix their nests to the branches of trees. Its size as far as could be judged was about $\frac{1}{80}$th of an inch long, by about $\frac{1}{200}$th of an inch broad. A sketch of this object will be found in a future plate of this Journal.—*Daniel Cooper, Fort Pitt, Chatham, July* 13, 1842.

[*Pl.* VI, *Fig.* 1, *a.*—The conical pile of eggs protruded from the marginal opening. *b.*—The body of the nest, with the contained ova seen through the walls. *c.*—The appendage by which the nest was fixed to the hair. *d.*—The bulb or root of the hair.]

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*Appendix to Mohl's paper on the Panctated Vessels of Plants.*—The references to the Figures in Plate V, having been omitted in their proper place, p. 146, they are here inserted:—

*Explanation of Plate* V, *Div.* 4.

Fig. *a.*—Walls of a Punctated Vessel contiguous to cells in *Chilianthus arboreus.*

Fig. *b.*—Ditto, contiguous to another Vessel—the punctations are broadly extended and simulate a scalariform duct.

Fig. *c.*—Longitudinal section of walls of two contiguous Vessels in same plant.

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*Erratum.*—At page 99, for *Plate* IV, *Div.* 2 & 3, read *Plate* V, *Div.* 2 & 3. We would recommend our subscribers to make this and other alterations with the pen, in order to save confusion.

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*Erratum.*—At page 131, in the references to Plate III, for *Div.* 6, read *Div.* 5, and in the place of what is there printed, read,—*a.* Nucleated particles from the healthy human liver:—*b, c, d, e.* The same from the liver affected with fatty degeneration, shewing in each the light points or *nuclei,* with their *nucleoli,* and the dark contents of each which are the *fatty globules.*

[A reference to this page placed in the margin of page 99, opposite the explanation to the plate, will remedy this error.]

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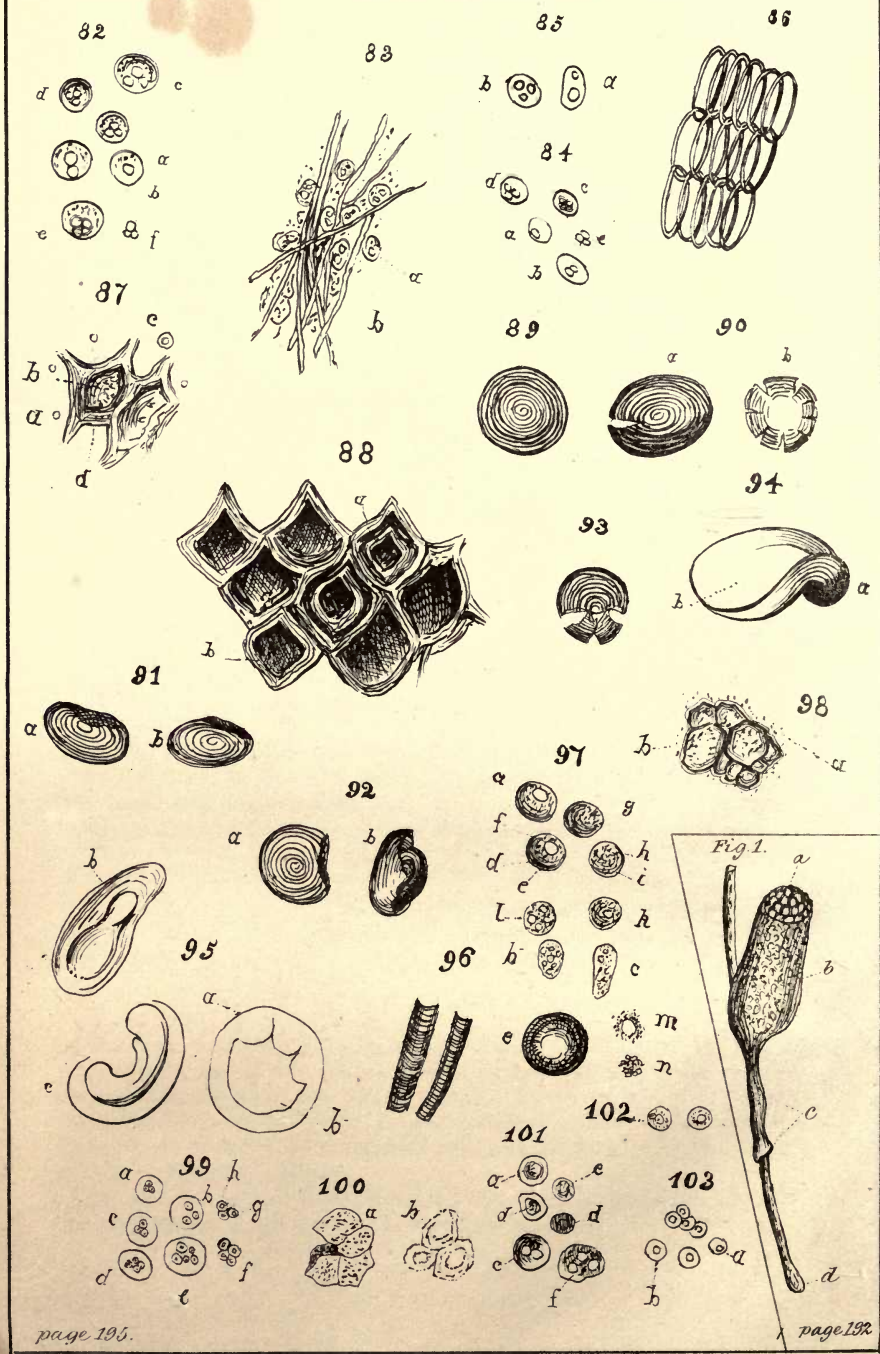
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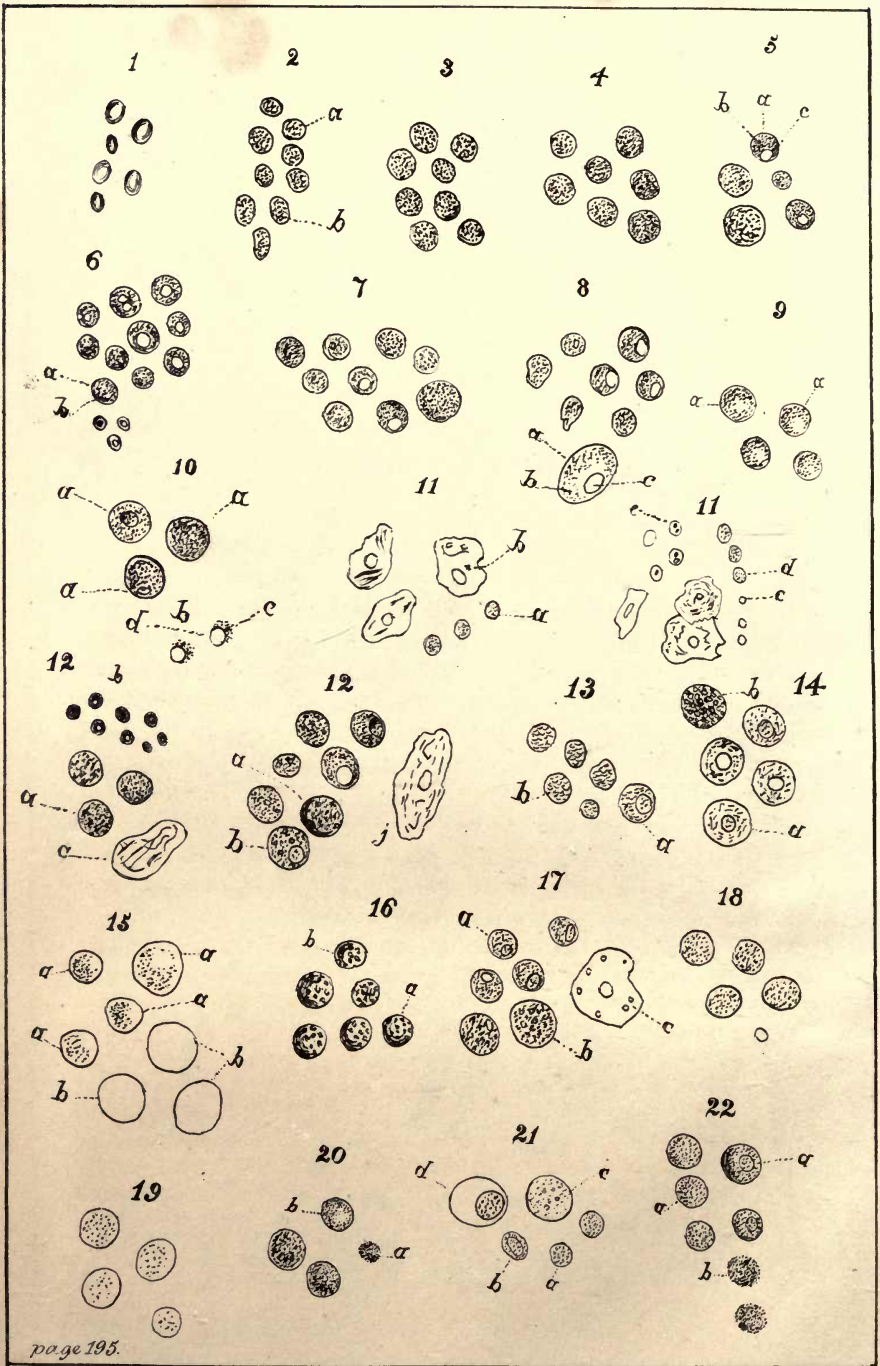
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## XXXI. — ON THE EXISTENCE OF OIL-GLOBULES AND CRYSTALS OF STEARINE IN THE CELLS COMPOSING THE ALBUMEN OF THE COCOA-NUT.

*By Daniel Cooper, Assistant-Surgeon to the Forces.*

It has been on several occasions a matter of some discussion among chemists, bearing more particularly on the wording of patent specifications, as to whether the Elaine and Stearine in the copra, or prepared cocoa-nut of commerce,—which is imported in considerable quantities from the East, for the purposes of expressing the oil for domestic and other uses and the stearine for the manufacture of candles,—existed in separate states in the substance of the nut. Having been a short time since consulted on this subject, I submitted a portion to microscopic investigation, with a view if possible to solve the question, The result of the examination was most satisfactory: affording one out of many valuable examples of the use of the microscope, as a means of solving hitherto considered mysteries connected with some of the most important of the Arts and Manufactures. It is well known, that when the copra, (as it is termed in Ceylon) is subjected to pressure at a low temperature, one of the principles of oily matter is obtained in a nearly pure state, this is doubtless *Elaine*—when, however, the pressure is exerted, at a temperature of between 70° and 80° Fahrenheit, in addition to the Elaine, there is obtained a quantity of *Stearine*—and if the heat be further increased, a still greater quantity of white matter is obtained, from which Cocoa-nut candles are manufactured.

At the suggestion of Mr. J. T. Cooper, who was professionally engaged at the time on the chemical nature of oils, and who from the above mentioned facts suggested in common,with Mr. Thomas Sturge, the idea of the Stearine and Elaine existing as two separate substances in the albumen or fleshy part of the Cocoa-nut, I was induced at their request to institute an examination—of which the following is an account.

Having made thin sections of the copra with a sharp scalpel, and placed them between two slips of glass with a little water, they were examined with a quarter of an inch Achromatic object-glass. In the interior of the elongated cells, of which the soft part of the nut is exclusively formed, could be perceived very small globules apparently of oil, scattered irregularly over their parietes,—in addition to which there

were also to be perceived very fine acicular shaped crystals occupying, and likewise irregularly distributed over the walls of the cells. These crystals, doubtless those of stearine, disappeared under the microscope, when gradual heat was applied, and were even lost altogether for some minutes, until the temperature became so much reduced as to cause them to be again deposited. By this process the stearine in the cells assumed a much more definite and regular crystalline appearance. The globules of oil (Elaine) are altogether independent of the acicular crystals above described. In the larger globules of oil, formed of numerous aggregated smaller ones, which were pressed out by enclosing the sections of the nut between the two slips of glass for examination, there were to be distinctly observed numerous plates or flakes of stearine of a still more regular crystaline form. These likewise were found to disappear when heat was cautiously applied, by radiation from a heated portion of metal held within an inch or more of the object as it lay on the field of the microscope, and became again deposited as the substance regained its former temperature.

From the facts mentioned above, and from the manner in which the examination was conducted for several successive times, I think there can be no question that the opinion of Mr. J. T. Cooper and Mr. T. Sturge is correct, and can at any time be satisfactorily demonstrated with a good quarter of an inch achromatic object-glass, by pursuing the course of manipulation just described.

### *Explanation of Plate* XI, *Div.* 1.

Fig. 1. Globules of oil, formed by the aggregation of a multitude of smaller oil-globules, which have escaped from the cells (2.) of the albumen.

Fig. 2. A longitudinal section of the albumen of the cocoa-nut, exhibiting its cellular structure, and the globules of oil free within the cells. Fine needle-shaped crystals (?) also occupying the interior of the cells, which are supposed to be those of stearine, but are more evident in the globules of oil, Fig. 1, where they have aggregated together in a more definite and apparent crystaline state.

Fig. 3. Fasciculi of needle-shaped crystals of stearine which have escaped from the broken extremities of the cells, and have arranged themselves in the water as here exhibited.

Fig. 4. Acicular crystals of stearine, which appeared of a more definite form, after applying radiated heat from a piece of hot iron held for a few moments within half an inch of the slide.

## XXXII.—*Microscopical observations on the morphology of the pathological fluids, by David Gruby, M.D.—No I.

*Translated from the Latin by S. J. Goodfellow, M.D., &c.*

The translator undertook the translation of the following observations last winter, as an occupation during a slight indisposition, and for the purpose of being able the more easily to verify them by further examination, as soon as an opportunity should offer itself. This opportunity, he regrets to say, has not been afforded to him; and believing that the subject merits further investigation, he has been induced, through the kindness of the Editors of this Journal, to adopt this method of bringing this little work to the notice of microscopical pathologists.

The observations were made during day-light, by Plössel's microscope, the diameter of the objects being increased 400 times. For diluting the objects, distilled water was used, and for changing their physical characters pure pharmaceutical re-agents.

In the following work are contained:—

1. Observations concerning the morphology of mucus.—Plate 7, figs. 1—22; figs. 23—26. Plate 9, figs. 51—53.
2. Observations concerning the morphology of pus.—Plate 10, figs. 27—41; figs. 42—50, 52, 54—58; figs. 59—64, 72—77.
3. Observations concerning plastic lymph and plastic exudation.—Plate 10, figs. 65—71.
4. Observations concerning a white, pellucid, and fluid exudation. (Serum).—Plate 10, figs. 78, 79, 81.
5. Observations concerning ulcers and mesenteric glands of abdominal Typhus.—Plate 10, figs. 72—77. Of the spleen, fig. 62.
6. Observations concerning lobular inflammation of the placenta.—Plate 10, fig. 80.

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* Observationes Microscopicæ ad Morphologiam Pathologicum, auctore Dr. Davide Grüby. Morphologia Fluidorum Pathologicorum. Tomi primi pars prima. Accedunt Tabellæ septem et Tabulæ litho sculptæ quinque. Vindobonæ apud Singer et Goering, 1840.—The Translator has thought it better to omit the short introductory essay, in which the Author has given a cursory review of the various discoveries in anatomy, by means of the simple and compound microscope, with a list of the names and works of the principal anatomists who have had recourse to their aid in the prosecution of their anatomical researches; because he feared that it would occupy too much of the space allowed to him in this Journal, without a corresponding advantage to the reader.

*Of Normal Mucus.*

Mucus taken from the healthy mucous membrane of the nostrils, settles into a greyish-white fluid, somewhat thick, easily drawn into threads, dries when exposed to the air, leaving a hard, fragile, transparent, greyish scale. Water does not dissolve it; rubbed with water for a long time it is loosened, softened, and swelled, and it is no longer to be drawn into threads. A small portion spread upon glass, and examined by means of a microscope, appears :—

1. Amorphous and greyish-white, with greyish black points irregularly scattered in it, (which I believe to be heterogeneous substances, from the air brought into contact and united with it.) Agitated for some time in distilled water, the blackish grey points are dissolved.

2. Moreover there are observed yellowish-white, round, or oval globules, two to four times more transparent than the red particles of the blood. Globules taken from the anterior part of the mucous membrane of the nostrils, appear without primitive molecules; but, investigated from the posterior part of the same membrane, they appear endowed with very small ones; dried in air they are rendered irregular and more pellucid; the primitive molecules disappear at the same time; exposed to distilled water, they are not changed, nor are their envelopes broken. Plate 7, figs. 1 and 2.

3. It contains lamellæ and cells of epithelium of a greyish-white or whitish colour, transparent, of an oblong or angular form, $\frac{1}{40}$ to $\frac{1}{30}'''$ long, $\frac{1}{50}$ to $\frac{1}{100}'''$ broad; the greater part of their surface is irregularly folded with here and there very small molecules deposited; they enclose a central nucleus, or a globule less transparent, exceeding by two or three times the size of the blood-discs, mostly oblong, less frequently round; dried in air, the little cell of epithelium becomes transparent, the opaque nucleus remaining. Distilled water does not change them. Plate 7, fig. 8, *a*, *b*, *c*; fig. 11, *b*; fig. 12, *c*; fig. 17, *c*; fig. 25, *d*; Plate 9, fig. 41, *e*, *f*; fig. 55, *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i*; fig. 53. *a*.

If the cells of epithelium have been treated for about five minutes with a small drop of concentrated acetic acid, sp. gr. 1,030, I have observed no change. The same occurs with solutions of oxalic and tartaric acids: sulphuric acid 1,090; diluted nitric acid 1,170; also with diluted hydrochloric acid 1,070, and liquid chlorine 1, 00.

The same occurs with hydrochlorate of ammonia, hydrochlorate of barytes, nitrate of potash, nitrate of barytes, sulphate of potash, acetate of ammonia 1,015, acetate of potash 1,200, and soda, with solutions of sulphate of iron and sulphate of copper; but nitrate of silver tinges the cell of a brownish colour.

Concentrated muriatic acid 1,200, nitric 1,170, sulphuric 1,090, butter of antimony, and oil of tartar, quickly renders the cell of epithelium perfectly pellucid, so that it is withdrawn from all further observation.

*Of Mucus produced from irritation of Mucous Membranes.*

The mucus of an irritated mucous membrane of the nostrils is white, pellucid, scarcely more consistent than the albumen of a hen's egg; exposed to the air the greatest part evaporates, and a very thin pellucid lamella remains. Distilled water is easily mixed with it.

Under the microscope, besides a few cells of epithelium, it is seen to contain round globles from four to five times larger than those of the blood; a few of them are of a white colour, perfectly round, with extremely thin pellucid envelopes, enclosing very small molecules.—Plate 7, figs. 3, 4; figs. 11, 12, 18—20.

*Of Mucus produced from Catarrhal (i. e. lighter) Inflammation.*

Mucus from catarrhal (i. e. milder) inflammation of the mucous membranes of the nostrils, conjunctivæ, fauces, larynx, bronchi, urethra, vagina, and of alimentary tube, has a greater consistence than that produced from *irritation* of these membranes. It is transparent, very tenacious, yellowish-white, thick, drawn out to a thread-like glue, dries more slowly in air, and a turbid, greyish-yellow elastic lamella remains. In distilled and river-water it falls to the bottom (if bubbles filled with air shall not have been mixed with them); exposed for a longer time to water, it is not changed, except that it swells somewhat and becomes whiter; exposed to a flame it burns and emits an empyreumatic odour.

Investigated by means of the microscope, I beheld:—

1. An amorphous greyish-white mass, not changeable by water.

2. Spherical whitish-yellow globules, the larger the quantity in the mucus the more intense the yellow colour; the diameter of the globules taken from a catarrh of the larynx exceeded eight times that of the blood-discs. These globules intimately cohered with the amorphous mass in which they appeared immersed, and were composed of a very thin diaphanous envelope, which was easily broken when made tense by shaking it with water; not *agitated* in water it is not broken, on account of the tenacious amorphous mass in which the globules are found immersed. In the middle, and oftentimes out of the centre towards the edge, is seen a perfectly round vesicle, which exceeds in size twice the diameter of the blood-discs; it either appears to be empty or filled with some pel-

lucid fluid. This vesicle, on account of the place which it occupies, may be called the central vesicle. In every globule there appear little points or very small globules, scarcely larger than one-sixth the diameter of the blood-discs, transparent or diaphanous, called molecules, and dispersed without order.

The quantity of these globules, and their magnitude, vary. We shall speak in another and more appropriate place concerning these.

When the globules have been dried, they change their round form into that of an irregular polyhedron, marked with more pellucid margins; in the middle there remains a granular yellowish substance, which surrounds a central vesicle, at first turgid, but by drying becomes changed into a white pellucid spot.—Plate 7, fig. 5, 6.

Sometimes two central vesicles are seen.—Plate 7, fig. 6, *d*.

### *Of Mucus produced by a more intense Inflammation of Mucous Membranes.*

Mucus secreted from mucous membranes affected with a more intense inflammation, is of a deep yellow colour, easily drawn out into threads without any order. It is opaque, and when dried, leaves a yellow, transparent, brittle substance; in distilled or river-water it sinks to the bottom, and forms flocculi: agitated with water it renders it turbid, but I saw the flocculi themselves, of a white colour, sink to the bottom. The flocculi, washed a long time in water, did not render it more turbid; those made of a lighter colour swam upon the water, and enclosed even then a few globules. The mucus, when dried, burnt with a flame. The mucus from opthalmo-blennorrhœa, acute urethral blennorrhœa, acute vaginal blennorrhœa in a puerperal woman is here alluded to.

Investigated by the microscope this mucus consists:—

1. Of a small quantity of a whitish amorphous mass, not soluble in water.

2, Of innumerable yellow globules, partly with, partly without central vesicles.—Plate 7, figs. 7—10, 12,* 14, 22, 23, 25. These globules, exposed for a long time to distilled water, swelled and became whitish. After the first minute they are broken, and the contained molecules are sometimes quickly, at other times slowly expelled, then sometimes leaped out, as if they were controlled by a physical law. They did not accumulate about the unchanged central vesicle, but every where exercised, for a long time, a molecular motion.

3. Cells of epithelium were rarely observed in this mucus; and if any occurred, they were round, full, and here and there with difficulty distinguished from the globules of mucus.—Plate 7, figs. 14, 15.

*Of Mucus from Mucous Membranes affected with Chronic Blennorrhœa.*

Mucus from chronic blennorrhœa of the vagina and urinary bladder, is yellowish-white, but little ductile, easily renders water turbid, and white flocculi remain in contact with the bottom of the vessel. I observed other properties like those with mucus produced from a more intense inflammation of membranes.

Under the microscope there appear:—

1. A small quantity of a ductile amorphous mass.
2. Very copious yellowish-white globules, of which some seem composed of an envelope, very small molecules, and central vesicles, some of an envelope and central vesicle, and lastly others of very small molecules only, and destitute of all covering.—Plate 7, figs. 20, 22.

*Of the Lochial Discharge.*

Shortly after parturition, the lochial discharge, rightly investigated, exhibits a sanguineous colour, gives out an animal odour, is but little ductile, and dried in the air leaves a red, friable mass. Treated with distilled water, three substances are observed:—

1. A reddish-white soluble substance, (Hæmatosine.)
2. White flocculi quickly falling to the bottom, (Fibrine.)
3. Yellowish-white flocculi suspended in the water, (Vaginal mucus.)

Investigated by the microscope, it consist:

1. Of a ductile amorphous mass.
2. Of blood particles.
3. Of mucous globules, composed of an envelope and primitive molecules.
4. Of epithelium.

When we compare mucus secreted from the vagina during parturition, Plate 7, fig. 2, which consists of small globules *a*, *d*, enclosing primitive molecules; also, of small globules *e*, enclosing two larger molecules, with mucus secreted 13 hours after parturition, Plate 7, fig. 12, we shall perceive an essential difference between mucus produced from the healthy vagina, and that from the same organ when irritated.

On the *second* day, globules endowed with central vesicles, appear; and, in proportion as the uterus shall have been injured, so in proportion will these globules be found increased in quantity. As the discharge becomes paler, the number of blood particles decreases, and the quantity of the larger globules on the contrary, increases.

On the *third* day after parturition, the reddish discharge contains many yellowish-white globules, provided with central vesicles and molecules; the quantity of blood particles decreases, and that of the ductile amorphous mass increases, (proper mucus.)—Plate 7, fig. 12*.

On the *fourth* day after parturition, the discharge is but slightly reddish, contains white flocculi, easily drawn into threads (of mucus), in which there are irregular, more obscure globules (corrugated epithelium), and some with central vesicles. A very few blood-particles are also contained in it.—Plate 7, fig. 13.

On the *fifth* day after parturition, the mucous discharge is yellowish-white, the globules which are found in it are white, and even ten times larger than the blood particles. There are very few or no small molecules included in them, and the central vesicles have disappeared, but I observed an increased number of larger primitive molecules in them.—Plate 7, figs. 15, 16.

From the *6th* to the *13th days*, the lochial discharge is white, consists of white, perfectly round globules, provided with the smallest primitive molecules without central vesicles or larger molecules.—Plate 7, figs. 18—20.

I have observed peculiar forms in a diminished discharge of the lochia, when inflammatory puerperal fever has attacked the mother; the central vesicle, for instance, exceeding by four or five times the magnitude of the blood particles, has been provided with primitive molecules, the globules, on the contrary, enclosing this vesicle being entirely destitute of them.—Plate 7, fig. 21.

Here and there, however, when the secretory process had been retarded, or when a more difficult parturition produced metritis, the central vesicles were found in the yellowish-white lochial discharge on the 5th and 8th days after parturition, and even beyond that time.—Plate 7, figs. 14, 17.

### *Of Dysenteric Mucus.*

Mucus, discharged from the intestine in the commencement of the dysenteric process, is limpid, easily drawn into threads, scarcely differs from the mucus produced from a mild diarrhœa; but the dysenteric process increasing, reddish and very thick mucus is evacuated. The red colour is caused by a mixture of the red particles of the blood with the mucus produced from inflammation of the mucous membrane. In the acme of the disease, the mucus is seen altogether as green; it no longer encloses globules of blood, but white, almost pellucid, globules deprived of all primitive molecules, having large central vesicles filled

with the smallest molecules, (I have observed this form in the lochial discharge of a puerperal patient.—Plate 7, fig. 21, and in the purulent exudation of recent purulent peritonitis, fig. 56.) I have, moreover, beheld peculiar green bodies intermixed with the dysenteric mucus.

See the explanation of Plate 7, fig. 25.

### OF SPUTA.

The mucus ejected from coughing differs according to the character, extent, and stage of the pathological process; hence I shall first speak of the sputa from normal inflammation; secondly, of sputa from anomalous inflammation, and also on the appearance of sputa produced by the tubercular process.

#### *Of Sputa generated by Normal Inflammation.*

Sputa produced in the commencement of a catarrhal affection of the air-passages, are found to be white, pellucid, thin, easily drawn into threads, and here and there they disclose within themselves a few small flocculent greyish nubeculæ. The quantity of these sputa bears a direct relation with the extent of the pathological process.

Investigated by the aid of the microscope, the white pellucid fluid contains a very few round globules, filled with primitive molecules, and many cells of nucleated epithelium; the globules as well as the cells appear immersed in the pellucid fluid (proper mucus), but the greyish flocculiare composed of copious round globules filled with primitive molecules, and linked together with the proper mucus.

The catarrhal process increasing, the greyish flocculi receive an increase, which at length, from a yellowish-white, become tinged of a deeper yellow colour; the more the flocculi increase, the more the quantity of white fluid mucus decreases, the sputa becoming globose, and extremely tenacious.

The flocculi, investigated under the microscope, are composed of round globules filled with primitive molecules and a central vesicle. These globules appear linked with extremely tenacious mucus; but the white mucus (properly mucus), is a white amorphous substance, easily drawn into pellucid threads, which disclose cells of nucleated epithelium, and a few globules of a yellowish-white colour, endowed with the smallest molecules and a central nucleus. The inflammatory process decreasing, the quantity of globular sputa decreases; they acquire a somewhat whitish colour, until, the inflammatory process being finished, all yellow secretion ceases.

*Microscopico-Chemical Investigation.*

The globules contained in yellow mucus, consist of smooth, very thin envelopes, in which again primitive molecules, and a single or double central vesicle are seen. The magnitude of the globules exceeds by six or eight times that of the blood-discs ; but the diameter of the central vesicles scarcely equals it.

Globules exposed to distilled water increase in volume, although they may all have been freed from the adhering mucus, the envelopes break, the central vesicle and primitive molecules remaining.—Plate 7, fig. 24.

Acetic acid 1,030 dissolves the envelopes and primitive molecules, but the central vesicles remain intact, aye and more than this, they are seen more clearly, but their number increases from one to six.—Plate 6, fig. 82.

Oxalic acid dissolves the envelopes, the central vesicles from two to five in number remaining.—Plate 6, fig. 85.

Tartaric acid quickly dissolves the envelopes; the central vesicles, observed of a white colour, remain.

Diluted nitric acid 1,170, corrugates the globules, and tinges them of a deeper yellow colour.—Plate 6, fig. 83, *a*.

Diluted hydrochloric acid 1,070, corrugates the globules.

A dilute solution of the nitrate of silver 1,075, corrugates the coverings of the globules, and leaves them tinged of a yellowish colour.—Plate 6, fig. 84.

Concentrated solution of nitrate of silver 1,275, at first dissolves the coverings and the primitive molecules, the central vesicles remaining, from one to four being seen clearly; but in a longer time the central vesicles themselves become dissolved.

Solution of pure potash 1,350, dissolves the globules, and a white pellucid mucous fluid remains.

Spirit of caustic sal ammonia 0,980, produces no change.

Lime water occasions no change.

Spirits of wine 0,830, contracts the globules.

In crude pneumonic sputa, white, irregular, turbid particles are found intermixed with mucus, which are composed of an entire patch of cells of non-nucleated epithelium, joined to each other in symmetrical order, on whose surface irregular globules (plastic exudation) are found.—Plate 6, fig. 86.

Tenacious mucus of yellow globose sputa, which embrace or enclose the globules above described, appears, when submitted to the microscope, white, almost pellucid, and free from globules.

Distilled water does not produce any change in it.

Treated with nitric acid 1,170, it forms yellow filaments, decussating among themselves in different directions, and marked with irregular, obscure margins. Plate 6, fig. 83, *b*.

The same happens if it have been treated with hydrochloric acid, 1,070.

Solution of nitrate of silver 1,075, forms filaments, which after a little time are dissolved.

Contentrated acetic acid 1,030,
Solution of oxalic acid,
Solution of tartaric acid,
} Occasion no change.

*Of Sputa generated by Anomalous Inflammation, and from the Tubercular Process.*

Sputa generated by the tubercular process, differ according to the nature, the extent, and the stage of the disease.

The tubercular process is three-fold:—

1. Miliary tubercular process.
2. The tubercular process of infiltration. And,
3. The tubercular process, forming solitary tubercles, distinguishing by turns the characteristic sputa which each process forms.

*Of Sputa ejected from the process forming Solitary Tubercles.*

A solitary tubercle, generating in the texture of the coats of the air-tubes, or in the cellular tissue surrounding the bronchi or blood-vessels, only affects the pulmonary secretion so as to increase it, and also presses upon the coats of the intermediate and capillary blood-vessels, as well as upon those of the minute bronchial ramifications, so much so as to impede or totally put a stop to the circulation of the blood, as well as air in that small portion of lung lying next the tubercle; the product generated from the irritation of the mucous membrane, differs in no respect from that of a mucous membrane irritated by the application of cold, therefore there is as yet no *qualitative* difference between the sputa of an incipient catarrhal process, and those of a commencing tubercular process; but a *quantitive* difference is given, for the sputa ejected from an incipient catarrh, are more copious than those which were expectorated from the irritation of a solitary tubercle.

The tubercle increasing the quantity of sputa increases until the tubercle becomes softened, which having taken place, besides the concocted or puri-form sputa, there are found yellowish-white and finely

granulated particles mixed with the white mucus; or, yellowish-white oval lenticular particles, whose longest diameter scarcely exceeds the half of a Viennese line adhering to the bottom of the smooth vessel in which the sputa are accumulated.

It is seen by the microscope, that these yellowish-white particles are a compound of roundish or ovate lenticular spheres, gashed globules, and mucus. The lenticular spheres are from the same size to ten times larger than the globules of pus; they present, for the most part, a smoothish surface, and in almost all, obscure striæ, running concentrically, are detected.—Plate 6, fig. 89. Some of these spheres are fissured once or oftener from the periphery towards the centre, the broadest part of the fissure continually decreasing, until it altogether ceases far in towards the centre.—Plate 6, fig. 90. They are easily broken, and break with angular margins, Plate. 6, fig. 91; whereas, if one look closely at the face of the fracture, he will perceive the lenticular sphere to be composed of concentric lamellæ, resembling a bulb of garlic. —Plate 6, fig. 92.

The lenticular spheres fall to the bottom in distilled water. Dried for a long time in air, they are not changed, with the exception of a slight diminution of their diameter.

They are not changed by distilled water.

A solution of caustic potash dissolves them.

They are in no respects changed by liquid ammonia 0,910.

Concentrated acetic acid 1,030, and solutions of tartaric and oxalic acids produce no change.

In dilute nitric acid all their diameters are enlarged from three to five times, and the concentric striæ disappear; they swell like inflated bladders, become semi-transparent, are bent in a different manner, and ultimately disappear altogether.—Plate 6, figs. 94, 95.

They are not changed in hydrochloric acid 1,070.

Carbonate of soda, acetate of lead, prussiate of potash, and ammoniacal sulphate of copper, do not change them.

Solutions of the nitrate of silver 1,275, change them in the same manner as nitric acid, only they do not disappear so quickly.

Infusion of galls, and pure alcohol 0,830, produce no change.

As long as the softened tubercle shall not have thoroughly been thrown off, so long are the lenticular spheres mixed with the sputa.

The tubercle being expectorated, the sputa again differ according to the difference of the pathological process; for, if the tubercular process has been local, the parietes of the cancer secrete globules of pus, which are ejected in union with the mucus of the irritated or inflamed

mucous membrane of the air-passages, until the contracted parietes and the cavern, forming a cicatrix by granulation, become consolidated, the lenticular spheres being no longer detected in the sputa.

But if the tubercular process (the individual labouring from a tuberculous dyscrasis), is not quieted by the ejected tubercle, the lenticular spheres are found constantly intermixed with the sputa.

There are seen in the tuberculous sputa, besides the lenticular spheres now described, and white tenacious flocculi before noticed, white mucous and granular-looking shreds. Investigated by the microscope they contain cells* composed of tetra or pentagonal margins, with obscure or unequally yellow centres, the striated margins having the diameter and texture of the intermediate vessels (capillaries).—Plate 6, figs. 87, 88. Besides these cells, there are here and there found yellow cylindrical fibres marked with black transverse lines (muscular fibres.)—Plate 6, fig. 96,

Sputa produced from other inflammations of an anomalous character, will be treated elsewhere.

### *Of Urethral Blennorrhœa.*

The fluid, which is secreted in the beginning of a catarrhal inflammation of the mucous membrane of the urethra, is white and not easily drawn out; contains very few globules which are four times larger than those of the blood, and composed of a smooth, transparent, very thin envelope, filled with the smallest molecules.

On the 3rd day of the disease, the secreted fluid is observed to be thicker, and of a yellowish-white colour. It is composed of numerous globules, for the most part perfectly round and yellowish-white, which are transparent, smooth, very thin envelope, the smallest molecules, and here and there a central vesicle.—Plate 7, fig. 7.

On the 9th day after the infecting coitus, the puriform fluid in preputial blennorrhœa contains numerous yellow globules, three or four times larger than those of the blood, some of which are seen composed of an envelope, and the smallest molecules, others of an envelope, the smallest molecules, and the central vesicle perfectly round or oblong.—Plate 7, fig. 8.

On the 21st day, the globules contained in the yellow secretion are very numerous, and are composed of a smooth envelope, the smallest molecules, and the central vesicle. They rapidly swell in distilled

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* Infiltrated pulmonal cells, (cellulas pulmonales infiltratas.)

water, the envelope quickly breaks, and the primitive molecules are seen accumulated around the central vesicle.—Plate 7, fig. 10.

On the 30th day, the thick fluid is perceived of a yellow colour, and few globules; and on the 40th day after the infecting coitus very few globules, and those for the most part ruptured, are found in the white and thinnish fluid.

*(To be continued at p. 225.)*

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## Extracts and Abstracts from Foreign Journals.

[From *Müller's Archives*, 1842.]

*Meyer on the Existence of a Distinct Membrane surrounding the Yelk in the Ova of Mammalia.*—Repeated observations made principally on the ova of the pig, have satisfied Dr. H. Meyer of the existence of a peculiar yelk membrane. He found this fact to be most clearly demonstrated in ova taken from ovaries which had been a few hours in alcohol.

The appearances upon which the existence of this membrane is presumed are as follows:—

1. The yelk granules are not in immediate contact with the inner surface of the chorion, but cease with a regular border, at a greater or less distance from it.—2. The interspace thus formed is filled with a yellowish granular matter.

Several experiments have proved, that this matter is a distinct membrane.

1. In one instance, on the bursting of an ovum, the yelk granules passed through the rent in the chorion, not scattered or separated, but in a mass, which was distinctly seen to be kept together by an envelope, by which it was attached to the edges of the rent, forming a sort of hernia; and within the almost empty chorion, a plicated, pale-coloured granular looking membrane was distinguishable.

2. Although the presence of the interspace between the yelk and the chorion does not prove that the former is enclosed in a peculiar membrane, yet it does prove that it is surrounded by something more than the chorion. That this additional envelope, however, is really a membrane, is proved, partly by the above observations, and partly by the result of an easy experiment.

3. If a drop of a solution of caustic potass be brought in contact with an ovum under the microscope, the chorion is very easily dissolved, yet the yelk remains unaltered; and it can now be readily proved, that the yelk granules still retain an envelope, by moving the glass covering the object, backwards or forwards, or by causing it to make pressure upon it, and increasing the pressure until the covering is ruptured and the yelk granules escape, the envelope remaining in the form of a granular, but otherwise structural membrane.

Dr. Meyer remarked, as had previously been done by Wagner, that

the space between the yelk and the chorion, or in other words that the thickness of the yelk membrane was increased by the absorption of water.

He further observes, that every part of the chorion is equally soluble in the caustic alkali, which circumstance may conduce to prove that it is a homogeneous membrane, and not a layer of albumen contained between two membranes, as some have supposed.

A figure, illustrative of the above described appearance, will be found in *Müller's Archives*, Tab. II. fig. 7.

*Oschatz on a New Cement or Lute for Microscopic purposes.*—M. Oschatz recommends, as a cement or lute for glasses containing microscopic objects, a composition of sealing wax and whitelead,—and for the purpose of keeping apart glasses, so as to prevent injury by their pressure upon delicate objects,—rings made of a vegetable pith, such as is afforded by the Helianthus annuus or the Chinese rice-paper.

M. O. has also invented, but not described, an instrument for cutting thin and uniform slices of different substances for microscopic purposes,

*Eschricht on Diceras rude.*—M. Eschricht, in a letter addressed to Müller, regrets the publication of a note of his on the so-called *Diceras rude*, (and which appears in our present volume, p. 153.) He states, that a more attentive examination has caused him to arrive at very different conclusions on the subject.

The pretended Entozoa correspond in every respect with Sultzer's figures, but the explanation is altogether wrong, as they are in fact only parts of the fruit of *Morus nigra* or the common mulberry.

The letter proceeds then to compare the different parts of that fruit with Sultzer's figures, and to point out their close correspondence.

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[From the *Comptes Rendus, June*, 1842.]

*Glüge on Entozoa in the Vessels of Frogs.*—M. Glüge has found, in the blood of frogs, an entozoon allied to those which constitute the genus Proteus of Ehrenberg. This animal, the existence of which in the blood of Salmo fario had already been discovered by Valentin, (vide p. 87) appeared to M. Glüge to undergo, in the blood of frogs with which it circulates, metamorphoses similar to those which have already been announced with regard to other Entozoa.

A second observation of M. Glüge refers to another entozoon, found in great abundance in the lungs of frogs, the *Ascaris nigrovenosus*. M. Glüge considers that the organ, whose situation is indicated externally by a black line, and which has hitherto been looked upon as the intestine, is in fact the ovary, and in it ova may be distinguished in different states of development, sometimes even containing an embryo coiled up. He has also observed the ova of this entozoon in the lungs of frogs, in which the adult animal was not present; and thence con-

cludes, that these entozoa are introduced in the state of eggs, and probably by respiration, into the lungs of the frogs infested by them.

*Dr. Fick* of Marburg describes a case in which he found the nerves of a diseased limb transformed into adipose tissue.

The disease appears to have commenced in the joints of the tarsus, and the whole limb to have become much swollen and infiltrated, and the affection had existed a long time, when it was amputated. Dr. Fick prepared portions of the *Saphenus magnus* and *Sciatic nerve*, several inches in length, tracing the larger branches as far as possible into the diseased tissues; and on careful microscopical examination, he found an unusual quantity of fat deposited among the fibrillæ constituting the nervous branches; and on tracing these fibrillæ farther into the diseased tissues, he found them to become fewer and fewer in number, their place being occupied by fat globules, which, especially in the smaller branches, appeared to be formed on the inner surface of the nervous sheath. At some distance from the diseased tissues, many primitive fibrillæ could be observed running through this fatty matter, which gradually, however, became fewer in number, and finally, in the whole sheath none were to be observed, it being occupied entirely by the fat.

*Göppert on the Spontaneous Movement of the Sporules of Nemaspora Incarnata (Pers.)*—It is no longer doubted at the present day, that the sporules of many Algæ, when mature, are endowed with the power of spontaneous motion, not referrible to any external or physical cause, but to be considered merely as an evidence of life. Similar motions in the sporules of Lichens have been seen by M. Link, and especially in the seed-vessels of *Limboria stricta*, in which he perceived a slowly progressive motion, which was still evident in specimens which had been gathered thirty years.* Meyen observed, that the sporules of *Mucor mucedo* occasionally moved when placed in water. In December of last year (1840), M. Oschatz showed to M. Göppert, sporules of *Phallus impudicus* enclosed in water, and which, although they had been removed from the plant eight weeks, presented a very slow but distinct rotatory motion, and which continued evident even after they had been in the water for a whole year.

On the first of October, 1841, M. Göppert placed in water some filaments of the remarkable *Nemaspora incarnata (Pers.)*, which were growing upon some willow branches standing in water in his chambers. The water soon dissolved and washed away the gelatinous matter, which probably contains the spores, and gives the mould-like form to the plant, leaving the extremely minute, elongated, and pointed, white-coloured, transparent sporules, free. They require, for their satisfactory examination, a power of 250 linear. To his no little astonishment, M. Göppert observed, that these bodies possessed lively motion, so that they rotated not only in a horizontal, but also in a vertical direction, and

* Froriep's Notiz. XII. No. 293, p. 104.

had even a power of locomotion, confined, however, to a very small compass. In the vertical position they assumed the appearance of black points, so that at first he supposed two sorts of sporules to be present, until, upon closer examination, he remarked that the change in the aspect under which he viewed them gave rise to this deceptive apperance.

He mounted some of these bodies in the manner described by M. Oschatz, and on 20th of November, or nearly eight weeks afterwards, the motion still continued as active as at first. Specimens of this plant, which had been collected in 1822, upon being macerated in water, afforded the same phenomena, although the motions were certainly less active.

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[From the *Annales des Sciences Naturelles, April*, 1842.]

*Unger on the Origin of Spiral Vessels.*—In the plant just emerging from the embryo condition, in which state only can the examination be made, there are two parts especially, the exact study of which throws the most light upon the development of the spiral vessels.

These two points are the summits of the stalks, with the buds and the extremities of the principal and of the lateral roots,—in other words, the two poles of the vegetable axis.

Before entering, however, into the details of this subject, it is necessary to understand fully the meaning of the expression *spiral vessels*, very different views in this respect having been entertained by authors.

In the sense attached to it by the old phytotomists, two sorts of organs are included; the one of which is distinguished by the presence of annular or spiral fibres, and is in the form of a simple annular or spiral vessel; whilst the other, instead of simple fibres, has them larger and more ramified, giving, in consequence, to the vascular membrane, a reticulated or sieve-like appearance; vessels of this kind have been denominated reticulated or striated, and of them the true porous ones are only a modification.

Since all these fibrous tissues are not found, as asserted by Meyen, in the original formation of the vascular wall, but only become deposited at a later period, on the originally homogeneous membrane of that part, it necessarily results, that all the forms of vessels above mentioned, originate in a similar manner, as far as regards the more essential points.

Direct observation, and the comparison of younger formations with those more advanced, indicate that the fibrous tissues belong, in some way, to a secondary layer, deposited on the primitive membrane of the vessel, and determine the manner in which this increase in the thickness takes place.

From this it appears certain, that the spiral vessels are not truly elementary organs, but that they are on the contrary composed of numerous cells, superimposed perpendicularly, and more or less cylindrical or

prismatic, and which, by their junction, form a continued whole; and in a morphological point of view, they are distinguished by this alone, perhaps, from the analogous spiral *cells*.

Two propositions, then, may be stated :—

1. That the wall of the vessels is like that of cells originally, homogeneous.
2. That the organization of the vessels, at their first origin, consists in cells arranged in a linear series.

M. Unger's conclusions are founded, principally, on observations upon the organization of the radical extremity, and especially of that of the fibrous roots of monocotyledonous plants.

He preferred for this purpose the sugar-cane.

Every fully-developed root presents in its interior a medullary part, surrounded by a vascular, or ligneous one, and externally a cortical. All these parts from the summit to the base preserve the same relative position with respect to each other. During the growth of the root, the medulla undergoes the least change; the bark rather more, and the vascular part by far the greatest; and it is to the changes in this part that the paper more particularly refers.

The ligneous substance of the root, like that of the trunk, is formed of vessels and of elongated cells, with walls of greater or less thickness. In the root of the sugar-cane we observe, near the extremity, eight larger vessels, distinguishable, in a transverse section, by their size; towards the exterior, several others of less diameter are visible, but in this situation not well defined. At the distance of about a line from the radicular extremity, the number of the larger vessels is nine; at about five inches there are ten; and at the base of a root twelve inches long, they amounted to twelve. On a successful section of the extremity of the root being made, which should not only divide it into two equal parts, but should also touch upon one of the eight larger vessels, no difficulty will be found in recognizing upon the section, the origin and successive development of these parts. It may then be observed that the vessels become contracted, by insensible degrees, towards the extremity of the root; but that at the same time the cells of which they are composed, become shorter and shorter, until their width is more than double their length; from which point, their transverse diameter rapidly diminishes, and finally their dimensions, in either direction, are nearly equal; and they have now become so small, that they can no longer be distinguished from the adjacent cells.

The extremities of the vessels, however, are not found, as might be supposed, at the very extremity of the root, but are situated a short distance from it; and, what is more curious, the extremities of all the vessels converge to one point, to reach which they are bent considerably. Moreover, as the rest of the cells composing the tissue of the radicular extremity, and which, like those of the vessels, are disposed in linear series, also converge to the same point, it is to be understood, that not only the vascular, but also the cellular formation of the root commences in, or starts from this point, which may with some reason be

considered the *punctum saliens* or *macula germinativa* of the radicle, and which, in consequence of its being the precise point at which all the organization commences, is continually in process of development.

The root of *Saccharum officinarum* teaches the following facts :—

The cells of the *punctum vegetationis*, examined under a high power, are the smallest of the root. Their walls are extremely thin and delicate, so much so, that no doubling can be seen between adjacent cells. They contain a homogeneous, non-granular mucilage, which differs but little from the wall of the cell, and represent in some measure the latter in an amorphous state. The cavities of the cells are not equal in all, which would seem to indicate, that in the larger cells partitions are formed which divide the space into two or more compartments. No traces as yet of nuclei can be observed, which appear in cells a little removed from this situation. From this it results, that this point, made up of elementary parts very small and perfectly homogeneous, is evidently organized, and that it differs from parts more fully developed, and into which it is continually being transformed, only by the tenuity of the walls of the cells, and by their homogeneous mucilaginous contents.

Having thus traced the commencement of the larger vessels, it remains to pursue their development in the ascending scale, and the mode in which the vascular utricules, by their apposition, constitute a perfect canal. About 77 millim. from the extremity of the radicle, the vascular utricules are as wide as they are long; their walls are of extreme tenuity, and they contain a mucoid matter, beginning to become granular. At the height of about a line, the cells are five or six times longer, but have not increased in width. They still contain a mucilaginous mass, in which, however, traces of organization can be recognized. It begins to coagulate into vesicles, which, when magnified, represent a vascular or cellular net-work. At the height of 12 centim., the length of the cells is again doubled, while their width remains the same. The membrane composing them also shows the same homogeneous conformation; but there are now observable, added to its contents, some cellular nuclei. It is not till they have reached the distance of four inches from the extremity of the radicle, that the walls of the vessels appear of any thickness, and at the same time become furnished with rudiments of pores. The smaller vessels, however, become more fully developed, even at the distance of two lines from the extremity. It is a remarkable fact, that those vessels which soon assume the reticulated form, present at first, in the form of their secondary layers, only a spiral disposition of the molecules composing them, in which respect they closely represent the type of simple spiral vessels. The metamorphosis in this case is easily explained, by supposing a partial *engorgement* of the spaces left vacant between the spiral fibres.

At five inches from the extremity, there is at last evident an organization in the membrane of the large vessels; nevertheless, even here the spiral band is not at first present, as in the small vessels, but the secondary (or internal) membrane is studded with numerous minute pores, giving to the vessels their reticulate appearance, similar to that of the porous vessels of dicotyledonous plants.

In conclusion, then, it is assumed that the metamorphosis of vessels is confined to these points :—

1. To the enlargement of the cells of which they are composed, which finally assume 90 times their original length, and 12 times their original width.

2. To the change of the membrane, which is at first tender and homogeneous, and finally becomes covered with pores; this change occurring sooner in the smaller vessels than in the large, where, moreover, it continues to present a transitory organization under the form of a spiral band.

3. To the multiplication of the great vessels, which takes place from 8 to 12 by the division of some of them, which division is effected by the formation of longitudinal dissepiments, dividing them into two or more parts.

The formation of vessels in general can then be reduced to the following points:—

1. The cell of the vessel at first appears under the form of a cell, with very delicate walls, the membrane composing which is perfectly homogeneous, and has not the least trace of striæ or any fibrous tissue.

2. Upon the interior of this delicate membrane there is sooner or later deposited, in the form of superimposed rings of spiral fibres or reticulated lamellæ, a second layer of analogous or identical composition, or indeed the fibrous tissue, in consequence of the subsequent deposit of similar material, passes from the spiral to the reticular form. Simultaneously with this internal deposit, a formation of similar layers on the external surface occurs from the thickening of the walls of the contiguous elementary organs, and which determines the disposition of the perforated places.

Finally, the secondary membrane does not begin to be formed until the cell of the vessel has nearly reached its full development.

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*Payen on the occurrence of Crystalline Deposits in the Tissues of Vegetables.*—A short notice relative to Payen's observations on the occurrence of crystalline deposits in the tissues of vegetables was given in our first volume; but as the subject is one of considerable interest, especially with reference to the mode of secretion of inorganic crystallizable matters in living bodies; and as the facts observed by Payen relative to the manner in which this secretion occurs in vegetables, appear to bear some analogy to those which have lately attracted attention with respect to the secretion of salts and other inorganic matters, by the mucous membranes of animals, we have thought it would not be uninteresting to give a more complete abstract of the results of Payen's observations, taken from a report upon his memoir, by M. Mirbel, in the Annales des Sciences Naturelles, December 1841.

Previously to Payen, M. Meyen had observed, under the epidermis of various species of fig, masses of crystallized mineral substances, suspended by a cellular cord in the interior of large utricules; but Meyen was deceived in some respects in what he saw. He conceived that the crystallized mass contained a thick kernel of gum, and that the crystals of mineral matter enveloped this kernel, an error which he would not

perhaps have committed, had he invoked the aid of chemistry. M. Payen, however, has succeeded in determining the nature of the crystallized substances, their position, and the mode of their formation, not only in the genus *Ficus*, but in other *Urticaceæ*, and in many other plants of different families. These productions are not formed simply of a crystallized mineral substance, but contain besides an organic tissue which secretes the mineral matter in solution, and becomes the matrix in which this matter is afterwards crystallized. It is consequently evident, that the apparatus must exist before the crystals are apparent. This apparatus, placed in the centre of a large utricule, is composed of two parts, distinct in their structure and function. The one is composed of a tissue in all respects similar to that surrounding it, and constitutes a cellular cord, attached by its superior extremity to the inner surface of the epidermic layers. The other part is a delicate tissue of cells, so minute that they appear scarcely more than points, and so numerous, that by their aggregation they form a mass of considerable size, suspended like a chandelier, at the end of the cord, in the cavity of the large utricule. The progress of vegetation produces no appreciable modification in the cord itself; but this is not the case with regard to the delicate tissue which secretes the carbonate of lime. The vacuities of this organ, become gradually filled with a solution of the salt, which soon crystallizes; and there are now apparent on the exterior cellular layer, the minute mamillary projections, sometimes angular, which Meyen, in his ignorance of the presence of the delicate cellular tissue, mistook for an envelope of bare crystals, deposited on the surface of the central gummy mass which he supposed to exist. The above description applies to many species of the *Urticaceæ;* but it must be remarked, that the same arrangement is not found in all the plants in which crystals have been observed. Those, for instance, of the *Cannabis sativa* and of the *Broussonetia papyrifera*, are suspended from the inner wall of the utricules composing the hairs of these two *Urticaceæ*.

M. Payen has described and figured the incrustations of carbonate of lime, which are met with in the stalk of *Chara*. He describes them as lodged in a superficial cellular tissue, containing much azote, and which envelopes the tubular utricules, disposed in a circular series, around the great central cavities.

The very different forms assumed by the crystals of oxalate of lime, and the position which they take in a great number of stalks and leaves, merit particular attention. This salt has been found in small agglomerations of acicular crystals, radiating from a common centre in the parenchyma, and around the nervures of the leaves of many plants. It occurs in rhombic crystals of a certain size in the parenchyma, of the leaves and under the epidermis of *Citrus*, of *Limonia*, and of *Juglans regia*, and in still larger masses in the *Cacti;* and M. Payen remarks, that there is a great analogy in the forms of crystals in the more allied species, citing as examples of this, *Opuntia*, *Echinocactus*, *Cereus*, *Cactus*, and *Rhipsalis*.

Every phytologist has observed the minute needle-shaped crystals named Raphides. They are so slender, that under a magnifying power of 300 diameter, they present to the eye of the observer merely

linear traces. The delicate experiments of M. Payen, aided by microscopic observation, have proved that the oxalate of lime, of which these acicular crystals are composed, is lodged in very minute cells, joined end to end in a linear series; and, consequently, that when the salt is dissolved, the membranous sheath which contained it becomes a flexible filament.

From this it is evident, that under the influence of the vegetable organism, the same crystallizable matter, oxalate of lime, may assume forms of great diversity, by the varied arrangement of its integrant molecules. M. Payen has, by incineration of the organ secreting the oxalate of lime, obtained a result no less remarkable than the above: he found that the cells which form the matrix, when destroyed by combustion, left on the plates of glass a silicious skeleton, which, under the microscope, was seen to retain the form of the organic tissue. Fragments of the stalks of *Gramineæ*, of *Equisetaceæ*, of *Cactus*, and of various leaves, petals, and grains of pollen, subjected to washing with acid, and to incineration, presented the same phenomena; delicate traces of silica reproducing the minutest details of the organization.

M. Payen, from these and similar researches, deduces the following law:—

"*That mineral substances contained in vegetables, even when they assume polyhedric crystalline forms, are not isolated or scattered at hazard, but are always deposited in the cells of an organic tissue, which determines and limits their agglomeration.*"

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*Ehrenberg on the Paper-like Substance from Silesia.*—At the meeting of the Berlin Academy, 24th June, 1841, "M. Ehrenberg read a report upon the paper-like substance from Silesia, of 1736, which had been sent by Prof. Göppert from Breslaw."

The Academy had commissioned the author, on the 4th of March, to report upon this substance which had been sent to it for examination by M. Göppert.

Since the microscopical analysis of the meteoric paper which fell in Courland in 1686 in a snow storm, and which was found to consist merely of a paper-like web of terrestrial *Confervæ* and Infusoria, it has appeared advisable to the author to institute a comparison between this and other similar and purely terrestrial phenomena which have been authentically recorded.

A similar appearance was especially that of the formation of a paper and a kind of wadding, which was left upon the surface of low-lying meadows and fields in Silesia, upon the subsidence of a great flood of the Oder, which lasted all the summer, and broke down the dykes in more than sixteen places. This caused so much distress in the country, by its preventing the growth of the later grass, that it excited great attention; and it was thought fit to send some of the paper-like substance to Vienna for the inspection of the Emperor.

This account is given by Dr. Kundmann, who then lived in Breslaw, in a work entitled, "Rariora Naturæ et Artis," &c.—P. 556.

The occurrence in later years, of similar formations near Sabor and Freiberg, has also excited considerable attention, and these substances have been exhibited to the Academy.

In order to determine how far this meteoric paper may have been brought, by perhaps some hurricane, before it fell in Courland, and whether it may not have been brought from a very distant part of the earth, the reporter, in his account of it, desired that the old collections in Breslaw might be searched for larger masses of the substance, in order to ascertain whether flowers or seeds of some known plants might not be interwoven with these leaves, which is said to have been the case originally, from which the true origin of this substance might with certainty be ascertained.

Prof. Göppert, correspondent of the Academy, has undertaken this scientific task, and has hitherto been unable to find in Breslaw any more of the paper of 1686; but he has discovered in the library of St. Bernhardin, two large pieces of natural paper, from which he surmises that they originated in the misfortune of 1736. This mass, which is composed of interwoven *Confervæ* and grass leaves, is about 34 feet long, and from 2 to 3 feet wide; on one side smooth and of a brownish ash-grey colour, and on the other of a greenish red-brown. This latter side is loosely interwoven with grass leaves, and has entangled in it small shells of the genus *Planorbis*, and other remains of minute aquatic animalculæ. The grey side is more compact, like grey blotting-paper, and contains small grass leaves. The grey smooth side is clearly the upper, and is somewhat bleached by exposure to the rays of the sun. The looser, green side is the under one, which had been in contact with the grass of the meadow.—(For the microscopical analysis of this substance, see p. 59, Vol. II. of this Journal.)

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*Werneck's Microscopical Observations and Descriptions of New Genera of Infusoria.*—At the sitting of the Berlin Academy, Nov. 25th, 1841, M. Ehrenberg presented to the Academy, by desire of Dr. Werneck of Salzburg, an extensive series of new microscopical observations upon descriptions of Infusoria.

These observations first allude to the little that has been done, for the last eleven years, in the advancement of our knowledge of the true anatomy of these beings. They are considered by M. Ehrenberg to be extremely accurate and important; and at the end of the account is given a list of some new genera of Infusoria of both classes, which we have subjoined:—

## I. POLYGASTRICA.

I. Calia.—Nestermonade.

*Char. Gen.*—Monades gelatina inclusæ (Pandorinæ) plantis aquaticis affixæ, nec liberé natantes.—Duæ species.

II. Eretes. W.—Rudermonade.

*Char. Gen.*—Phacelomonades loricatæ.—Una species.

III. Ancyrium. W.—Ankerfuss.

*Char. Gen.*—Bodones enterodeli, pede setaceo mobili (Bodo grandis) eique affines.—(6 ?) species.

IV. Stephanoma. W.—Kranzkugel.

*Char. Gen.*—Pandorina, animalculorum serie circulari unica, corpusculis singulis ad Gonii modum dividuis.—Una species. Eximiæ formæ genus.

V. Dicella. W.—Doppelbart.

*Char. Gen.*—Bursaria setis duabus immobilibus appendiculata.—Una species.

## II. ROTATORIA.

I. Malacostomum. W.—Weichmund.

*Char. Gen.*—Notommatæ edentulæ.—Tres species.

II. Brochocerca. W.—Schlingenfuss.

*Char. Gen.*—Monocercæ pede setaceo basi fisso. — Sed hæ formæ a Monocercis satis gravibus notis vix differunt.—Quinque species.

III. Rhynchopogon. W.—Rüsselbart.

*Char. Gen.*—Diglenæ rostro bilobo insignes.—Duæ species.

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*Ehrenberg's further results of his Researches into the Berlin Subterraneous Living Microscopic Organisms.*—At the sitting of the Berlin Academy, Nov. 11th, 1841, the author made the following communication:—One of the most striking circumstances with regard to the Berlin deposit of Infusoria, part of which are still in the living state, is the fact, that these forms which are thus met with, apparently in a condition to germinate, being filled with green granules, are for the most part not to be found living on the surface in the neighbourhood of Berlin, although they have been sought for with the greatest assiduity.

These species were especially *Gallionella decussata* and *G. granulata*, which are very readily distinguished from all other *Gallionellæ* by their regular, shagreen-like surface, and which occur in vast numbers. Both these species were previously only known to occur as dead shells in the probably tertiary Bergmehl deposit near Kliecken, and in a similar formation in Greece, as also in a deposit lying under peat in North America. With these were many angular silicious spiculæ, similar to those which have hitherto been observed only in marine sponges.

Latterly, from two quarters, some facts illustrative of these enigmatical relations have come to light.

M. Ehrenberg hoped to have been able, in a journey he made in the summer, to the East-sea (Ost-see) in Mecklenburg, to have cleared up this phenomenon, by the finding of similar forms in the sea-water at that locality, or in the brackish water of the marshes; but nothing similar

to them occurred to his observation. But, on the other hand, he unexpectedly obtained the explanation he had hitherto sought in vain, by the assistance of Professor Howeger of Berlin, who furnished him with some mud from the Peene, at Wolgast in Pomerania.

In the Peene, near Wolgast, not far from the sea (Ost-see), and which also is in the district of the Oder, there are found many of the species which are met with living in the Berlin deposit. They are here found on the surface of the river's bottom, and especially the two characteristic *Gallionellæ*, mixed with many various living marine animalculæ. It is thus rendered certain, that these species belong to brackish-water, or at least to river-water, with an admixture of sea-water.

They are not found in the bed of the Elbe near Cuxhaven.

It also appears, from a figure by M. Turpin, in his "Rapport sur une Note de M. Dujardin, sur l'Animalité des Spongilles," in the Comptes Rendus, 1838, p. 556, that there is near Paris a species of fresh-water sponge hitherto confounded with *Spongilla lacustris*, which has its silicious spicula furnished with spines, whilst in the northern species none but smooth spicula are met with. Consequently, some of those forms of spicula which have been ascribed to marine sponges, may in reality belong to fresh-water species, whose existence still remains unknown.

The Parisian *Spongilla*, in which M. Dujardin imagines he has observed animal life, is not in fact *Spongilla lacustris*, but should have another name, and for it M. Ehrenberg proposes the name of *Spongilla (Badiaga) Erinaceus*.

Moreover, there are in the Berlin deposit three distinct kinds of spinous spiculæ, none of which altogether resemble M. Turpin's figure, and which are probably all marine.

The report concludes by mentioning the occurrence of a bed of earth containing blue phosphate of iron, mixed with Infusoria, in a part of the great deposit; and, finally, by stating that the geognostic relations of the Infusorial bed are determined with certainty. It rests immediately upon brown coal sand (Braun kohlen sand), and is covered by loam, which has upon it the (Murkischen sand) above both alluvial deposits or mud.

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*D'Orbigny's List of the Foraminifera of the Chalk of England.*—M. Alcide D'Orbigny, in his paper "Sur les Foraminiferes de Craie Blanche de Bassin de Paris," published in the "Memoires de la Societé Geologique de France, 1840," enumerates, describes, and figures the following species of *Foraminifera* he has met with in the chalk of England. For the sake of those of our readers interested in this branch of inquiry, we extract the names of the species described by this observer, and append the references to the descriptions and figures, which are to met with in the work above cited:—

1. *Dentalina sulcata.*—D'Orb. p. 15. Pl. I, figs. 10, 11, 12, 13.—Length, 2 to 3 millim.
2. ——— *gracilis.*—D'Orb. p. 14. Pl. I, fig. 5.—Length, 1 and 1½ millim.

3. *Dentalina aculeata.*—D'Orb. p. 13. Pl. I, figs. 2, 3.—Length, $3\frac{1}{4}$ millim.
4. *Marginulina trilobata.*—D'Orb. p. 16. Pl. I, figs. 16, 17.—Length, 2 to 3 millim. (Found only in a young state.)
5. *Cristellaria rotulata.*—D'Orb.—Lenticulites rotulata. Lam. 1804.—Diameter, 2 millim.
6. *Rotalina Voltziana.*—D'Orb. p. 31. Pl. II, figs. 32, 33, 34.—Diameter, $\frac{1}{2}$ millim.
7. ——— *Micheliniana.*—D'Orb. p. 31. Pl. III, figs. 1, 2, 3.
8. ——— *umbilicata.*—D'Orb. p. 32. Pl. III, figs. 4, 5, 6.—Diameter, $\frac{1}{2}$ millim.
9. ——— *crassa.*—D'Orb. p. 32. Pl. III, figs. 7, 8.—Diameter, 1 millim.
10. ——— *Cordieriana.*—D'Orb. p. 33. Pl. III, figs. 9, 10, 11.
11. *Globigerina cretacea.*—D'Orb. p. 34. Pl. III. figs. 12, 13, 14.—Diameter, $\frac{1}{4}$ millim.
12. ——— *elevata.*—D'Orb. p. 34. Pl. III, figs. 15, 16.—Diameter, $\frac{1}{2}$ millim.
13. *Truncatulina Beaumontiana.*—D'Orb. p. 35. Pl. III, figs. 17, 18, 19.—Diameter, $\frac{1}{2}$ millim.
14. *Rosalina Lorneiana.*—D'Orb. p. 36. Pl. III, figs. 20, 21, 22.—Diameter, $\frac{1}{2}$ millim.
15. ——— *Clementiana.*—D'Orb. p. 36. Pl. III, figs. 23, 24, 25.—Diameter, $\frac{1}{3}$ millim.
16. *Bulimina variabilis.*—D'Orb. p. 40. Pl. IV, figs. 9, 10, 11, 12.—Length, 1 millim.
17. ——— *obtusa.*—D'Orb. p. 39. Pl. IV, figs. 3, 6.—Length, $\frac{1}{2}$ millim.
18. ——— *obliqua.*—D'Orb. p. 40. Pl. IV. figs. 7. 8.—Length, 1 millim.
19. ——— *Murchisoniana.*—D'Orb. p. 41. Pl. IV, figs. 15, 16.—Length, $\frac{2}{3}$ millim.
20. *Gaudryina pupoides.*—D'Orb. p. 44. Pl. IV, figs. 22, 23, 24.—1 millim.
21. *Textularia turris.*—D'Orb. p. 46. Pl. IV, figs. 27, 28.—Length, $1\frac{1}{2}$ millim.
22. *Lituola Nautiloidea.* Lam.—D'Orb. p. 29. Pl. II, figs. 28, 29, 30, 31.

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## PROCEEDINGS OF THE MICROSCOPICAL SOCIETY OF LONDON.

*July 20th*, 1842.—*J. S. Bowerbank, Esq., in the Chair.*

At the meeting of this Society a paper was read by Mr. John Quekett, "On the peculiar arrangement of the Blood-vessels in the Air-bladder of Fishes, and on the evidence they afford of the true function of that organ." The author, after alluding to three principal modifications of

the air-bladder in fishes generally, went on to describe that of the cod-fish, which he stated to be a thick muscular bag, without any opening externally, and provided, on its ventrical aspect, with a highly vascular body, which has been supposed to perform the office of secreting the air contained in the bladder. The author described the minute distribution of the vessels in this so-called gland, the capillary system of which was composed of a great number of parallel vessels, aggregated together in bundles, and forming loops at the free surface of the gland; and in the other part of the bladder the arrangement was also remarkable for the parallel manner in which the vessels were disposed in this fish; three, but in others as many as six vessels, ran parallel to each other. The fact of the air-bladder being subservient to the function of respiration, was supported to a certain extent, by the distribution found in the anterior compartment of the air-bladder of the eel. In this fish the vascular net-work approached more nearly that of the cellular lungs of the Batrachia than any other class of vessels. The author concluded by stating, that the probable use of the gland in the closed air-bladders might be not that of secreting air, but of keeping in a pure state the air already there, as those fish provided with a gland generally live in deep water, and from having no outlet to the bladder, are unable to change the contents, should they become impure. The paper was accompanied with injected specimens, and with diagrams of the most important parts alluded to by the author.

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## Microscopical Memoranda.

*Cantor on the Infusoria met with at the mouth of the Canton river.*—From comparison with M. Ehrenberg's great work upon Infusoria, it would appear that most of the forms observed at the island of Lantoa, situated at the mouth of the Canton river, and at Chusan, also inhabit Europe. The new forms added, as "dubia," are those to which Dr. C. has found none corresponding among Ehrenberg's. To G. W. Grant, Esq., an indefatigable microscopical observer, who kindly examined the sketches and notes made by Dr. C. of Chinese animalcules, he is indebted for the following list of forms described by M. Ehrenberg, which Mr. Grant has recognized as also occurring in fresh water in and near Calcutta:—

*Sphærosira volvox.*
*Closterium turgidum.*
*Euglena longicauda.*
*Epipyxis utriculus?*
*Arcelina aculeata.*
*Arthrodesmus quadricaudatus.*
*Micrasterias hexagona.*
*Navicula fulva.*
——— *turgida.*
*Vorticella patellina.*
*Coleps hirtus.*
*Lepadella emarginata.*
*Brachionus urceolaris.*

From what has been stated, it will appear, that Indian forms (to which may be added a few Javanese), prevail in the fauna of Chusan, and that European forms make but a secondary feature.—*Annals of Natural History, July*, 1842, *p.* 361.

*Hassall on Showers of Pollen.*—The American Journal of Science and Arts for January, 1842, (p. 195), contains some interesting remarks relative to two showers of pollen, one of which fell at Troy, New York, the other in the harbour of Picton, a portion alighting upon a vessel in the harbour on a serene night in June, and having to be collected and thrown over by the bucket-full in the morning. A small quantity of each of these powders was preserved and sent to Prof. J. W. Bailey, to submit to microscopic examination. This gentleman ascertained, that the powder which fell at Picton was wholly composed of the pollen of a species of pine, and that from Troy was made up of pollen from various trees; but Prof. Bailey was not able to state positively what plants furnished it. Figures of the three forms of pollen granules met with in the powder from Troy, accompany Prof. Bailey's letter. From an examination of these, I find that two of them are to be referred to some Endogenous plant, one of them most probably to a species of grass, the other perhaps to the genus *Nymphæa,* and that the third form is undoubtedly the pollen of an Exogen, not unlikely to be the *Corylus.* Prof. Bailey thinks, that no part of the powder can be sporules of *Lycopodium;* because, he remarks, our species of that genus do not flower until July or August, whereas the powder in question fell in May. I arrive at the same conclusion, but for a different reason; the sporules of *Lycopodium* do not present at all the structure of any one of the three figures.—*Ann. Nat. Hist. June,* 1842, *p.* 353.

*Phillips on the Microscopic Structure of Coal.*—A paper was read before the Geological Section of the British Association, in which Mr. Phillips observed, that there was no difference of opinion as to the vegetable origin of coal, but only as regarded the circumstances under which those vegetable masses were accumulated. In order to determine this, several modes of investigation might be followed, one of which was, to examine the coal itself, in order to ascertain the nature of the plants of which it is composed. In the microscopic examination of polished slices of coal, by means of transmitted light, some results had been obtained by Mr. Hutton of Newcastle; these observations had not been published, but he believed Mr. Hutton had detected a cellular structure in the substance of the Northumberland coal, which at first sight might be imagined vegetable cells. These cells had been supposed to contain much, if not all the gas of the coal; and in this respect the Northumberland coal differed from the anthracitic, in which the cells were empty. It had been his intention to employ some of the ingenious processes recommended by Mr. Reeve, who had discovered the means of making fossil vegetable tissue apparent to the senses by a process of combustion; but having lately observed something remarkable in the combustion of Staffordshire coal, he was induced to examine it microscopically, without waiting to adopt any more refined process. He observed that the ashes of wood and peat differed in appearance and structure; and this Staffordshire coal, which did not cake, but burned to a white ash, resembled in its combustion the laminated peat of the north of England, or the compact black peat of Dartmoor. Upon examining these ashes, he found abundant traces of vegetable structure, consisting of small por-

tions of woody tissue imbedded in other tissue, apparently of plants much lower in their organization. He had also detected traces of structure in the ashes of anthracitic coal received from Sir H. De la Beche. Mr. Phillips considered this evidence rather in favour of the view that coal was in a great measure formed by plants growing on the spot, and not by drifting; the evidence of such drifting was formerly much stronger impressed upon his mind; but he had met with many phenomena, and this amongst them, which tended very much to diminish the force of his former conclusions.—*Athenæum, July 16th*, 1842.

*Hassall on the Growth of the Confervæ*.— The rapidity of the growth of most species of *Confervæ*, has been a subject of surprise to many observers of nature, and the explanation which I am about to offer of the causes of this very rapid growth, has not, that I am aware of, been before noticed. Most, if not all, the *Confervæ* appear to me to increase in two ways: first, by the continued growth of the free extremities of the different filaments; this method is obvious, and need not be insisted on. Secondly, by the repeated growth and subdivision of each cell entering into the formation of the filaments. I long suspected the existence of this mode of development, but was first convinced of its reality by an examination of those species of the genus *Conjugata* of Vaucher, distinguished by the presence of spiral tubes winding round the interior of the cells, and especially of the one named *Conjugata princeps*. If the filaments of this species be carefully examined and contrasted together, it will be seen, that in some the length of the cells only just exceeds their diameter, and that each cell contains three spiral tubes, which together perform from seven to eight turns in each, the coils almost touching each other; that in others the length of the cells is more than three times the diameter, but that still each cell contains only the same number of spiral turns, viz. seven or eight, which now, instead of being nearly in opposition, are widely separated, thus plainly proving the elongated cells to be derived from the growth of the shortest ones. And again, it will be noticed in others, that the cells have returned to their original length, but that each now contains only three or four spiral turns, thus manifestly proving the division of the elongated cell, and completing the chain of evidence which establishes to demonstration the existence of the mode of growth to which I have referred in the section of the genus alluded to. The number of spiral tubes varies in this and other species in different filaments, but not in the same: and this makes a corresponding difference in the length of the joints or cells, which are longer if there be four or five tubes instead of three. The proofs now to be adduced, that this mode of growth likewise takes place in all *Confervæ* which are composed of simple unbranched filaments, a large class, are little less conclusive than those first commenced. In most of the filaments of these, the cells will be observed to be of various lengths, some twice as long as others, and these again of very intermediate length. Now, by means of this law of growth, this variation in the length of the cells is at once and satisfactorily accounted for, which is not to be done in any other way. But this is not all: the progress of the formation of the septa which divide

the cells, may be frequently traced either in the same or different filaments, which is alone sufficient to establish the reality of the existence of this law of increase in this numerous section of the class *Conferva*. The only *Confervæ* to which I should for a moment hesitate to apply this method of development, and I believe that it is applicable to them likewise, are the branched species, to which such a means of increase is less necessary, seeing that, unlike those with simple unbranched filaments, they have innumerable terminal points of growth. Now I beg to lay particular stress on this law of development, which is evidently very important, inasmuch as it not merely goes to account for the rapid growth of many species of *Confervæ;* for it is simultaneously in operation in each of the many hundred cells of which each filament of most *Confervæ* is composed; but it likewise teaches us that much caution is requisite in determining species, as it proves that the character most relied on for this purpose, is one subject to very great variation; that is, the length of the joints. There is a limit, however, to this law of development, which does not, in the section of the genus *Conjugata*, to which reference has been made, allow of more than one or two divisions of each cell, unless, indeed, the spiral tubes grow likewise in an equal ratio, which may be the case, and then the division of the cells may be frequently repeated. In those *Confervæ* which do not contain spiral tubes, the multiplication of the cells may go on to an almost endless extent. To illustrate the importance of attention to this law of development in determining species, I may observe, but for this timely discovery, I should have described several species of *Conjugata* as distinct, which are really not so, considering the length of the cells and number of spiral tubes in the interior of each cell to be the most decided characters whereon to found specific differences. They are not so, however, one of the most certain being the diameter of the filaments. But, carying this law in view, it is not difficult to estimate the extent of variations in length to which the cells are subject, first as ascertaining what the primary length of the cell is. In the branched *Confervæ*, there are laws of development, some of them peculiar to each species, presiding over the arrangement of the branches and cells, which have hitherto escaped the scrutiny of man.—*Proc. Dublin Nat. Hist. Soc., June* 1*st*, 1842, *quoted in Ann. Nat. Hist., July*, 1842, *p.* 431.

*Griffith's Observations on Santalum, Osyris, and Isoetis.*—In *Santalum* the ovulum consists of a nucleus and an embryo-sac, prolonged both beyond the apex and the base of the nucleus; the albumen and embryo are developed in the exserted part above the septum; the mass of the embryo is developed directly from the vesicle, which is the termination of a pollen tube; the seed (albumen) has no other proper covering than the incorporated upper separable part of the embryo-sac.

In *Osyris* the ovulum is reduced to a nucleus and an embryonary sac, prolonged exactly in the same directions as in *Santalum*, but not to such a degree anteriorly; this anterior portion resembling exactly the unchanged part of the sac of *Santalum* below the septum. The albumen and embryo are formed outside the sac, and are absolutely naked, or whatever covering they may have, did not enter into the composition of the ovulum.

Mr. Griffith adds, I have lately looked at *Isoetes capsularis*, Roxb.; it is an instructive plant, for it shows that botanists are mistaken in their supposition as to the male. In Roxburgh's plant the contents of the sporangium are sometimes of two sorts, but both have the same origin, both are precisely similarly constituted, except perhaps as to contents; and the largest of these, the males of authors, become afterwards like the others, but larger. There can be no doubt that in all these plants the true sporules or seeds are thus produced by division of an original simple cell or its contents. *Isoetes* and *Azolla* prove, too, a thing of some importance, that the dissimilar organs which have so puzzled botanists may have a similar origin. The true male of *Isoetes* will probably turn out to be the oblong, cordate, fleshy laminæ above the female. On the male my observations were stopped by indisposition. As a male it is certainly anomalous; it is probably, I conjecture, developed originally within the leaf, and the scale between it and the female is probably analogous to the indusium of ferns. The most instructive plant is *Anthoceros* (which is not a *Hepatica*), for this may explain Ferns, by showing that a pre-existing organ, to be acted upon by the male influence, is not necessary. Endlicher says *Isoetes* has no stomata; De Candolle figures them in his "Organographie;" in *I. capsularis* they are very evident: no matter whether emerged or submerged, all plants having a cutis have stomata.—*Proc. Linnæan Society, Dec.*, 21*st*, 1841.

*Valentine's Supplementary Observations on the Development of the Theca, and on the Sexes of Mosses.*—The author commences his letter by stating, that subsequent observations have induced him to concur entirely with the views of Professor Mohl as to the sporules of Mosses being developed by four in a mother cell, a fact which he was led to doubt in his former communication, printed in the 17th volume of the Society's Transactions. The present paper contains a detailed account of the development of the theca in *Œdipodium Griffithianum*, which exhibits a beautiful example of the tetrahedral union of the sporules. In this moss the four sporules in each mother cell are piled on each other so as to form a cone with a triangular base, and they appear to be connected with each other in the young state by a very minute stalk which is situated at the conjunction of three radiating lines. This connexion is perhaps in most instances dissolved at an early period, and the sporules recede a little from each other, but are still kept in the triangular form by the mother cell. It is not uncommon, however, to find the connexion unbroken after the sporules have arrived at maturity, and in these instances there seems to be a general adhesion at the opposing faces of the sporules.

The author concludes his paper with some remarks on the analogy that exist between sporules and pollen, which, he observes, is so remarkable, and the particulars so numerous, that the essential identity of the two can be scarcely a matter of opinion.—*Proc. Linn. Soc.*, 1839.

*Dissecting Instruments to use with the Microscope.*—A small scalpel with a thin and narrow blade, whose edge is curved backwards, and two common needles, very sharp, and fitted into handles like that of the scalpel, are all the instruments required for the microscopic dissection of organs. The scalpel is used for dividing, and the needles for separating and clearing the parts, and for bringing them into contact with the re-agent employed, or into the field of the microscope. A few small hooks may also be provided, attached to threads having a small leaden weight at the end, for the purpose of stretching membranes which are submitted to observation. When the object under examination is immersed in an acid, small wires of platina are used in place of needles.

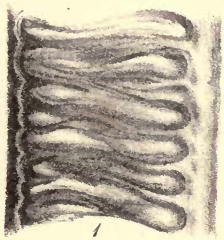
*Dropping Tubes.*—These are glass tubes drawn out to a capillary opening at one end by the lamp; and they are used for placing on the object-holder a drop of the re-agent whose action is to be examined, and which has been introduced through the same end by sucking. They may be prepared very easily by heating the middle of a piece of glass tube till it be softened sufficiently to be bent, and after it is cold, applying the flame of the lamp to one of the branches at a short distance from the bend. When it is quite red hot, laying hold of the two ends, they are to be drawn asunder, when the softened part will be drawn out till it becomes capillary; and if broken off at a convenient length, it will be found pervious.—*Raspail's Organic Chemistry.*

*Harrison on Transverse Striæ on Navicula Hippocampus.*—In our last number we noticed the existence of distinct *longitudinal* striæ on this species of Navicula. Our attention has since been directed to *transverse* striæ on the same species by Mr. Harrison of Hull. We can with him testify their presence, after some considerable patience and manipulation as regards the modification of the light. They are more evident in the single shell, not mounted in Canada balsam, than in the slide in which they are set up in that menstruum.

*Grimelli on the Vascular Structure of the Iris.*—In the Annali Universali, 1841, M. Grimelli has published an article on the structure of the iris. By injections of coloured oils thrown into the carotids, he has been able to inject the interior of the eye, and all the vessels of the iris. During his injection he has seen the iris swell, and from his observations on the direction and form of these vessels, he believes that that membrane is of a vascular, and not of a muscular structure.—*Lond. and Edin. Month. Jour. Med. Science, Jan.* 1842, *p.* 58.

[If we mistake not, the late Sir Astley Cooper demonstrated this fact some years since; the specimens are, we believe, still to be seen in the Museum left by that distinguished anatomist.]

*Busk on the Hairs of Animals.*—The references to the figures in Plate 2, will be given in the continuation of Mr. Busk's paper "On the Structure of Hairs and other Cuticular Appendages in various classes of Animals.—No. 2, page 225.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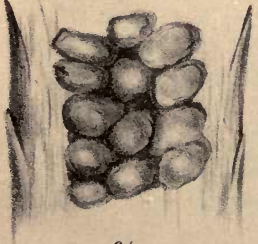
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p.224. *Busk on the Hairs of Animals.*

J. Basire, lithog:

## XXXIII. — On the structure of hairs and other cuticular appendages in various classes of animals.—No. 2.

*By George Busk, Esq., Surgeon to the Hospital Ship, Dreadnought, &c.*

The hairs figured in Plate 2. accompanying the present number of the Journal, are those belonging to animals in the following classes of Mammalia :—

I. Rodentia.

Rabbit—figs. 5, 7, 15, 24.
Rat—figs. 14, 18.
Musquash (Mus. Zibeth. Gm.)—figs. 13, 22, 23.
Hare—fig. 10.

II. Carnivora.

1. *Digitigrada.*
   *a. Viverrine.*
      Ermine (Putorius. Cuv.)—figs. 1, 2, 12.
      Stoat or Fitch (Putorius ? Cuv.)—figs. 4, 6, 9.
      Sable (Mustela. Zibell.)—figs. 3, 21.
   *b. Feline.*
      Cat—fig. 17, 20.
      Ocelot (F. Pardalis)—fig. 11.
      Tiger (F. Tigris)—fig. 16.
   *c. Canine.*
      Dog (Canis Fam.)—fig. 19.
2. *Insectivora.*
   Mole (Talpa)—fig. 8.

The hairs of the Rodents here figured, farther corroborate what was advanced in the former notice on this subject (p. 33), namely, that in this class the hairs are furnished in the interior, with distinct, regular, colour cells, in which only, is the colouring matter of the hair deposited. In fig. 15, the white hair of a rabbit, the cells will be observed to be quite empty; and in fig. 24, which is taken from a hair partly black and partly white, some of the cells are empty, while others are more or less filled with black matter.

In the smaller hairs of the animals belonging to the feline tribe, nearly the same regularity of formation and disposition of cells in the interior is observable; but this regularity is not preserved in the larger ones, as it is for the most part in those of the *Rodents*. Indeed, the cells appear to become obliterated in most of the larger hairs, as in fig. 16. The cells, also, in this tribe, as in the *Canine*, assume more or less of an angular form, and do not appear to be exclusively the seat of the colour, as in the former class. Whether, in fact, the cells in these hairs do really contain colouring matter, I have not positively ascertained. In the smaller hairs of the Viverrine tribe, the same regularity of form and arrangement of cells obtain; they are, however, usually empty, and in the larger hairs, they coalesce into an irregular cellular texture, as in figs. 4, 9, 13, 22; but in the sable, one of this tribe, they retain a more regular arrangement, but still less so than is the case in the larger hairs of Rodents. In this tribe, also, the whole of the colour is not exclusively confined to the cells, but pervades the horny tissue of the hair, as may be seen in the black hair of the tail of the ermine. A striking difference between these hairs of the Carnivora above mentioned, which have distinct cells, and in this respect resemble the hairs of Rodents, and those of the latter class, exists in the circumstance of the former having the surface covered with regularly imbricated scales, very strongly marked, as seen in figs. 4, 9, 17. In the larger hairs, however, in which also the internal cells are irregular or deficient, the scaliness on the surface no longer retains, in all cases its regularity and distinctness, as in figs. 6. 13, 16, 23.

The hair of the mole, the only insectivorous quadruped I have yet figured, has the distinct, regularly-arranged colour cells of the Rodent, but which, even in the larger hairs, are still in a single series, their width increasing in proportion to that of the hair, from side to side of which they always reach, and are not multiplied as in the latter.

The hair of this animal is also peculiarly characterised by the unilateral, toothed appearance, owing to the projection on one side only of the hair of the surface scales.

(*To be continued.*)

## XXXIV.—MICROSCOPICAL OBSERVATIONS ON THE PATHOLOGICAL MORPHOLOGY OF SOME OF THE ANIMAL FLUIDS, BY DAVID GRUBY, M.D.—No 2.

*Translated from the Latin by S. J. Goodfellow, M.D., &c.*

[Continued from page 206.]

### OF PUS.

I HAVE considered the following questions concerning pus, which are sufficiently trite, indeed, but as yet have not been performed with the penetrating examination which the difficulty of the subject required, in order to ascertain:—

1. What is understood by the name of pus?
2. If a material difference can be shown between pus from a wound (pathological organ), and pus from the surface of an organ whose continuity is uninjured?
3. Whether a material difference is to be observed between pus and mucus?
4. If the product from the commencement of suppuration to the termination of the process be always the same?
5. What material changes are observed between pus produced from a normal process of suppuration, and that produced from an anomalous process.

Pus secreted by an abscess is a yellow fluid, of an agreeable animal odour, of the consistence of cream; that from the process of inflammation or irritation is composed of globules three or four times larger than those of the blood, and a fluid. Allowed to rest, a double stratum is perceived, the upper one being very fluid, the lower thicker.

The inferior stratum, submitted to the microscope, is perceived to be endowed with yellowish-white, and perfectly smooth globules, joined together by a viscid fluid. The globules exceed in size three or four times those of the blood; most of them are round, some are oblong, others wedge-shaped. They consist of a transparent envelope, with usually one, sometimes two, but seldom with no vesicle enclosed in them; the diameter of the central vesicle scarcely exceeds that of the blood-discs, the remaining space is filled by the small and large primitive molecules.—Plate 6, fig. 97.*

* Gerber thinks that pus-globules secreted from wounds, are nothing more than exudation-globules, which lie beyond the vivifying influence of the surface of the

The coverings exposed for a long time to distilled water, perceptibly swell, and are ultimately broken, the central vesicle, surrounded by the primitive molecules, remaining; but this being deficient, the congregated primitive molecules alone remain.—Plate 6, fig. 97, *m*, *n*.

Globules exposed for a long time to the air have yellow polygonal margins, which surround a white pellucid space.—Plate 6, fig. 98.

Acetic acid sp. gr. 1,030, renders the globules diaphanous, the coverings sensibly vanish, with from two to five nuclei, which at first were not clearly seen, remaining; the nuclei, which have an amber-yellow colour, are round, and their magnitude is in indirect relation to their number. Hence, when you perceive five nuclei, their diameter scarcely exceeds one-third of that of the blood-globules; but when two only are seen, their diameter exceeds the half of that of the blood-globules.

The nuclei within the margin have a black ring, and within this they show another black ring, enclosing a central lucid spot.—Plate 6, fig. 99.

The nuclei swim together in a certain symmetrical order in the surrounding fluid, which being evaporated, they disappear, and nothing except the rudiments of the envelopes, previously softened in acetic acid, again comes into view; they bear an irregular angular or spherical figure, with a very thin black or punctated margin, showing in their centre a white pellucid spot surrounded by extremely fine points.—Plate 6, fig. 100, *a* and *b*.

Oxalic acid produces the same change as acetic acid.

Tartaric acid quickly produces the same changes.

Solution of caustic potash 1,350, quickly dissolves the globules,

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wound, and exposed to the influence of external agencies, and therefore forsaken, as it were, by the organizing principle, begin to degenerate in their organization, and to suffer changes in their chemical constitution, whilst those that continue in immediate contact with the living structures of the body, advance in their organization: those globules that are cast loose then die—mors vitæ origo.

"On the exudation-globules that are free, a number of delicate lines, radiating from a centre, are first perceived, which divide their peripheries into from six to eight (seldom more) segments; these lines become more and more distinct, and the capsule appears as if it were torn or cleft, but without separation of parts; in many globules, too, the nucleus now appears inclined to fall into from two to three pieces; the originally reddish-yellow colour of the globules fades, the segments of the envelope and divisions of the nucleus, which had been linear and sharp in appearance, become rounded off till they appear like aggregated granules, whilst the pus, now completely formed, acquires a greenish-yellow hue."—*Gerber's Elements of Anatomy, translated by Mr. Gulliver.*

and form a white fluid resembling mucus, which is easily drawn into threads, and when dried, no form is any longer seen.

Caustic ammonia does not change the globules.

Diluted nitric acid 1,170, corrugates the envelopes of the globules, and forms one contracted central nucleus, which is distinctly to be seen. Plate 6, fig. 102.

Diluted hydrochloric acid 1,070, like nitric acid, corrugates the envelopes, and one moderately clear and contracted nucleus is seen.

A solution of nitrate of silver 1,275, renders the coverings transparent, the remaining contracted nucleus being clearly seen.—Plate 6, fig. 103.

In alcohol 0,830, the envelopes of the globules become corrugated, the nucleus, when there is one only, equals twice the diameter of the blood-globules; or when three nuclei are found, they are even five times smaller than the blood-globules.—Plate 6, fig. 101.

The upper stratum is more fluid, is endowed with much fewer globules of pus, and a greater quantity of the white pellucid fluid. The fewer globules it contains the whiter is the colour, and the more of fluid (serum) is contained, the more fluid the stratum is found to be.

In large subcutaneous rheumatic abscesses, the different fasciæ, cellular tissue, and the smaller vessels and nerves, are found infiltrated with pus.

Globules of pus found in the parenchyma of organs, evidently separate its fibrils and fibres one from another and surround them; hence the colour of the parenchyma is changed to yellow, reddish-yellow, brownish-yellow, greenish-yellow, according to the quantity of pus-globules and the colour of the organ in its healthy state; thus, for example, cellular tissue, which is white, when infiltrated by pus, becomes yellowish-white, or from white, greenish-yellow.—Plate 10, fig. 64. The liver, also, when infiltrated with pus, from reddish-brown, becomes yellow; the kidnies, from red, change into a yellow colour. By this infiltration, the texture of organs loses much of its cohesion and tenacity, the organs are consequently rendered friable and soft, until the number of the globules shall have so increased, that the lacerated fibrils completely dissolve, and, mixed with pus are enclosed by the surrounding texture, which is as yet firm. This state of things is called an abscess. Some of the globules of pus which have been shut up for a long time in an abcess, are composed of an envelope filled with very small molecules, others of the small molecules only.—Plate 10, fig. 61.

*But the globules taken from a metastatic abscess, thirty-six hours after death, were destitute of all covering.*—Plate 10, fig. 62. Globules taken

from an abscess of the liver thirty-four hours after death, consisted of an envelope filled with the smallest molecules.—Plate 10, fig. 63. Pus from a wound suppurating torpidly for twenty years, with a base furnished with hard and long granulations, was yellowish-white, contained a few globules, and a great quantity of cells of epithelium in different states of evolution.—Plate 9, figs. 54, 55.

Exudated purulent peritoneal fluid of a yellowish-green colour, besides globules of pus with an envelope filled with small and large molecules, contained other globules which were destitute of all covering, and transparent, and of epithelium, beset with larger molecules.—Plate 9, figs. 56, 58; Plate 10, fig. 59.

The yellow flocculi swimming in peritoneal exudation, are composed of coagulated fibrin, enclosing globules of pus.—Plate 10, fig. 60. Recent peritoneal exudation, Plate 9, fig. 56, contains globules whose central vesicle is provided with the smallest molecules.

## OF VARIOLA.

### 1.—*Modified Variola.*

Of the material changes which we find in the products of this pathological process, some take place during the formation of papulæ, or of vesicles, and others during the formation of pustules.

Being preceded by three days of inflammatory fever, the red spots, in about twenty or thirty hours, appear changed into papulæ; and the limpid fluid, in small quantity, which was extracted from the affected epidermis, offered an alkaline re-action; under the microscope, a few larger, white, almost pellucid globules appeared in it, together with animalcules composed of a globose or conoid trunk, very thin neck, which was crowned with a small hook, with which they exercised a continuous motion, by turning the neck forwards and backwards.—Plate 9, fig. 42.

On the *third* day of the eruption, the limpid fluid extricated from the papulæ, contained, besides the molecules, a few pellucid globules, exceeding by two or three times the size of the blood globules, abounding with primitive molecules, which scarcely exercised any molecular motion. The animalcules, at one time curved, at another conoid or cylindri-form, the hook being retracted, sometimes exercise a very quick circular motion.—Plate 8, fig. 31; Plate 9, fig. 43.

The molecules without the globules are of different sizes; the smallest which are visible scarcely exceed the $\frac{1}{20}$th, the larger $\frac{2}{20}$—$\frac{4}{20}$ths, and

the largest $\frac{5}{200}$—$\frac{10}{200}$ths of the size of the blood discs. The smallest globules scarcely exceed in size $\frac{1}{200}$—$\frac{1}{200}$ths of the blood-globules.—Plate 8, figs. 29, 30.

On the *fourth, fifth,* and sometimes on the *sixth* days of the eruption, the limpid fluid which is found in the vesicles in small quantity, presents globules almost pellucid, with large and small molecules, and here and there they are provided with central vesicles.—Plate 8, figs. 31, 35, 36; Plate 9, fig. 45. The molecules which fill the globules exercise a powerful motion even with the envelope broken, (the envelopes are not easily broken.) Animalcules and small globules, as above described, also appear.

On the *fourth, fifth,* and sometimes on the *sixth* and *seventh* days of the eruption, the fluid contained in the vesicles, has an alkali like the serum of milk. The globules of pus turgid with the larger molecules, are increased in number, and exhibit a yellow colour. Globules destitute of molecules are seldom seen in this fluid, and the molecular motion is very evident. In fat individuals, there is sometimes found in it a globule of fat. In some, large, round, or oval globules are seen, exceeding in size the globules of pus four to six times, endowed with the larger molecules, and of a marked yellow colour. The envelopes of some of the globules of pus are more quickly broken, and conoid and cylindrical animalcules are also seen.—Plate 8, figs. 32, 37.

On the *fifth, sixth,* and sometimes on the *seventh, eighth,* and *ninth* days of the eruption, the fluid in the pustules becomes thicker, and of a deeper yellow colour, and has scarcely any perceptible alkaline re-action. It contains many yellow globules, the envelopes of which are easily broken. Some of the globules are destitute of all envelopes; but the more the pustules approach the stage of exsiccation, the more intensely the globules are marked of a yellow colour, and the quicker the envelopes are broken: hence they become irregular, some corrugated by drying; others, their envelopes being broken, dissolve, and the molecules which they enveloped, I have observed, dispersed without order. The molecular motion at length ceases, and with the fluid may be mixed recent and older cells of epidermis; this continues until all the fluid which held the globules and molecules suspended in it is evaporated, and inflammation having ceased, is not renewed. Hence a thick pus is continually secreted, until ultimately this becomes dried, turns into a hard crust, which we believe to be made up of a compound of small and large molecules, a few globules of pus, conoid animalcules, and dried cells of epidermis.—Plate 8, figs. 33, 34, 38—41; Plate 9, figs. 47—50.

### 2.—*True Human Variola.*

True human variola seldom occurs among us. I have observed this severe pathological process in one individual only. The pellucid lymph from papulæ, here and there broken, contains, on the *seventh* day of the disease, white globules, not perfectly round, but fimbriated on one side as if torn from the place of their growth, exceeding by four or five times the magnitude of the blood-globules, and which we observed to be provided with a pellucid covering and very small molecules. There are, moreover, formed in this fluid, small white or yellowish globules, and also a few globules of the blood.—Plate 9, fig. 52.

Death, which put an end to the disease on the following day, prevented, to my sorrow, any ulterior investigation.

## OF LYMPH AND PLASTIC EXUDATION.

The plastic lymph, an integrant part of the living blood, united to serum and the red particles, constitutes blood. The living blood circulating in the organism, when investigated by the microscope, appears composed of two elements :—

*a* Of globules ;* and,

*b* Of a pellucid fluid, in which the globules float ; the liquor sanguinis :—

Fresh blood taken from the circulatory passages, received in a sufficiently deep vessel, and kept at rest for some time at a moderate temperature, coagulates, and its constituent parts separate from each other.

The globules, on account of their great specific weight, fall to the bottom ; but the liquor sanguinis also divides :—

1*st*. Into plastic lymph (fibrin) which coagulates, and united with the globules forms the clot, but accumulated on the surface without globules, forms the so-called phlogistic, buffy crust ; and,

2*dly*. Into serum, in which the clot floats.

The globules of the blood are again endowed :—

1*st*. With an envelope ; and,

2*dly*. With a nucleus.

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* Particles or discs would be the more correct appellation for these corpuscles, since all *recent* microscopical observers agree in opinion that they are not globules ; but, as the author in the original work has given to them the name *globuli*, the Translator, from a wish to deviate as little as possible from the literal translation, has allowed it to remain.

The envelope of the globules is a red substance, soluble in water, from whence the blood takes its red colour, and is called cruor (hæmatosin); but the nucleus is not soluble in water; it is white, and is called fibrine.

The plastic lymph, on account of its lighter specific weight, coagulates, and constitutes the superior part of the clot (namely, the so-called phlogistic or buffy crust), exhibiting a yellowish-white colour, and is of very firm consistence, tenacious, elastic, and transparent.

The blood coagulating quickly, offers no phlogistic crust, for the globules of the blood, on account of the more rapid coagulation of the plastic lymph, are not permitted to fall to the bottom; hence they become suspended by it, and do not change the place which they occupy. They tinge the clot in every part of a red colour; hence, on account of the equable distribution of the plastic lymph, the clot preserves an equable tenacity and firmness in every part.

The serum of the blood, extricated from the clot by the coagulation of the plastic lymph, appears of a greenish-white colour, and is a thin and transparent fluid. Blood, quickly coagulating, extricates but little of the serum, because a part of the serum remains shut up in the plastic lymph; the quicker, therefore, the coagulation of the blood, the smaller the quantity of serum which is extricated; and, vice versâ, the slower the coagulation, the more of the serum is extricated, (i. e. in blood free from any dyscrasy); so that the quantity of serum extricated is in direct relation with the quantity of phlogistic crust; for when there is a large phlogistic crust, then there is a large quantity of serum, and when there is no crust, then but little or no serum is extricated.

Blood stagnating in the heart and large vessels, life being extinct, separates in the same manner into its constituent parts, viz., into clot and serum, the clot, as in vessels out of the organism, adapting itself to the form of the vessels in which it remains. In the heart and large vessels it forms oblong, globose, cylindrical, or conoid pieces, the superior part of which, of a white colour and gelatinous, constitutes the phlogistic crust, composed of plastic lymph; but the inferior part of the coagulated blood, of a deep black, is composed of the globules of the blood. These coagula are called polypi of the heart. The recent plastic lymph of these polypi, investigated by the microscope, is composed of soft, very thin, transparent fibrils, running in a straight and parallel direction, and enclosing among them very small molecules.—Plate 10, fig. 65.

The plastic flocculent exudation of purulent puerperal peritonitis, is composed of plastic lymph and globules of pus.—Plate 10, fig. 60.

The yellowish gelatinous plastic exudation produced from recent peri-

carditis, is composed of transparent, very thin fibrils, running parallel, or for the most joined into fasciculi, and also of the smallest molecules and globules, exceeding by twice or thrice the diameter of those of the blood.—Plate 10, fig. 67.

The hard, plastic, greenish-yellow exudation from the mucous surface of the uterus, is also composed of soft, parallel fibrils, intermixed with numerous molecules, and the globules of pus are seen equally distributed among the fibrils.—Plate 10, fig. 66.

The plastic yellowish-white exudation formed on the external surface of the heart for three or four days (the villous heart), consists of soft, gelatinous fibrils, united into fasciculi, and running in a parallel direction, which enclose within themselves a few white transparent globules, exceeding by twice or three times the diameter of those of the blood, and filled by the smallest molecules.—Plate 10, figs. 68, 69.

The white, somewhat rough, plastic exudation of the villous heart, formed from the *sixth* to the *eighth* days, is composed of roughish, single fibres, running flexuously.—Plate 10, fig. 70.

The hard, white plastic exudation of the villous heart, formed from the *fourteenth* to the *twenty-eighth* day, is endowed with hard fibres, forming oblong and round areolæ.—Plate 10, fig. 71.

### OF THE WHITE PELLUCID FLUID SEROUS EXUDATION.

The limpid serous fluid of a bladder, formed by the application of a blistering plaster, investigated by the microscope, consists of two constituent parts, viz., a perfectly fluid part, and a few white globules floating in it. These globules are diaphanous, and scarcely exceed twice the diameter of those of the blood. They are invested with a very fine, smooth envelope, which includes the smallest molecules. Here and there, also, globules occur destitute of all covering, and endowed with naked, very small molecules.—Plate 10, fig. 78.

The limpid serous fluid received from the papulæ of modified variola, contains, besides the larger globules, others in no respect different from those of the serum.—Plate 8, fig. 29,

The limpid serous fluid extricated from recent infiltration of intestine of abdominal typhus, contains the same globules of serum.—Plate 10, fig. 77.

The limpid serous fluid filling the interstices of the fibrils of the plastic exudation of the villous heart, contains globules not differing from those of the serum.—Plate 10, figs. 67, 69.

The white pellucid fluid of a serous cyst (morsus diaboli) contains white, perfectly round, smooth globules, destitute of all covering, smaller, or a little larger than the globules of the blood.—Plate 10, fig. 81.

The white pellucid serous fluid, with which the skin is rendered turgid in œdema, contains white or yellowish globules with stellate points. —Plate 10, fig. 79.

## OF THE ULCERS AND TUMID MESENTERIC GLANDS OF ABDOMINAL TYPHUS.

*(Of Ileo-Typhus—Ulcerous Ileitus—Gastro-enteric Fever, inclining to Nervous—Gastro-enteritis—Nervous Inflammatory Fever—Versatile Nervous—Nervous Fever with Stupor.)*

Abdominal typhus, that multiform disease, designated by so many names by the most celebrated authors, has as many forms. In this place we shall speak of the pathological mutations of the substance and texture of the inferior part of the ileum; also of mesenteric glands adjacent to this, and of the changes in the spleen.

In bodies examined on the *fifth* day of the disease, besides a turgid state of the membranes of the ileum, there is seldom any kind of disease to be seen.

Those who die on the *tenth* day, besides a turgid state of this membrane of the ileum, show roughish, somewhat elevated lenticular or oblong patches, the extent of which exceeds one or two inches, called crude infiltrations by the most celebrated anatomists. The mucous membrane covering the *lenticular* infiltrations, *slightly* adheres to them, and is easily removed from the part, and thrown into folds; but the mucous membrane lying over the *oblong* infiltrations, adheres *firmly* to them.

The muscular coat is intimately joined to all the crude infiltrations.

The infiltrations thrust forward the mucous membrane, whose surface is equal and smooth, whilst they are lenticular; but when it covers the oblong patches, it is uneven and furnished with many small elevations and depressions. The places which the oblong patches occupy, correspond to the seat of the glands of Peyer.

The texture of the infiltrated patches is firm, tenacious, white, or yellowish-white, and a white, limpid, serous fluid is extricated by pressure, which, investigated by the microscope, contains white globules, composed of a smooth covering filled with the smallest molecules. The

globules are round or oblong, and exceed the diameter of the blood-gobules once or twice.—Plate 10, fig. 77.

The ileum of patients dying on the *fifteenth* day of the disease, offers infiltrated patches, covered here and there near the valve of Bauhinus, with hard brittle greenish, or greyish-yellow, or brownish crusts, the thickness of the crusts increases to half a line and beyond; but the thickness of the infiltrations from half a line to almost two lines.

The crusts investigated by the microscope are composed of a substance irregularly granulated. They adhere at first firmly to the infiltrated patches; but somewhat later they adhere slightly, and are easily separated from them.

The slightly adherent crust, being removed, leaves an ulcerous infiltrated patch, whose margins are hard and elevated, but whose bottom is uneven, hard, slightly excavated, and covered with a very little fluid of a greyish colour.

Under the microscope, round white globules are found in the fluid, of which some are composed of a smooth envelope, enclosing the smallest molecules, others of the smallest molecules only. Their diameter exceeds twice or four times that of the blood-discs.—Plate 10, fig. 72.

The infiltrated substance taken from the margins of the ulcer, offers, under the microscope, conoid or elongated corpuscles, mostly in the broader part, enclosing a central vesicle, their narrower part is prolonged into a thin fibril; intermixed among these, white, transparent, round globules appear, four or six times larger than those of the blood, and filled with the very smallest molecules.—Plate 10, fig. 73.

The infiltrated substance taken from the bottom of the ulcer, contains the same microscopic forms,—Plate 10, fig. 74, (depicted close together.)

The intestines, investigated on the *twentieth* day of the disease, exhibit few entire, infiltrated patches, but many ulcers, partly covered with crusts, partly clean excavations already freed from the crusts, the margins and the bottom being somewhat rough.

On the *twenty-fifth* day of the disease, the margins are somewhat elevated, the bottom of the ulcers appear but little rough, and here and there a crust is still found.

Those who die on the *thirtieth* day, exhibit ulcers with the bottom somewhat depressed, thin smooth margins; here and there fibres of muscular membrane appear in the fundus; in some the bottom is closed by the peritonæal membrane; in others it is perforated, and

a free passage given to the contents of the alimentary tube into the peritoneal sac.

On the *fortieth* day of the disease, generally no more ulcers are to be detected; in their place, small smooth depressions of mucous membrane are found, provided with no intestinal villi and no follicles; the peritonæal serous membrane investing this small part, is remarked of a livid colour. The intermediate net-work, covering the depressed patch of mucous membrane forms oblong and angular areolæ.

On the *sixtieth* day the depressions of mucous membrane are furnished with elongated cylindrical villi, distant from each other, and also with a few simple and shallow follicles.

The net-work of intermediate vessels forms angular, round, or oval areolæ.

Those mesenteric glands, which lie next the ulcers, most often swell; they grow red or livid, are rendered softer or more fluid; the degree and extension of the pathological changes in the glands being seldom found in indirect relation with the changes in the intestine.

The fluid extricated from the tumid, red, and livid glands, and examined by the microscope, is greyish-white; it contains, besides some globules of blood, a good many round, white globules, exceeding in extent from three to six times the blood-discs, with a smooth envelope full of the very small molecules. Globules are here found, furnished with one or more central vesicles.—Plate 10, figs. 75, 76.

The changes of the spleen in abdominal typhus, respecting its increase of volume; of absolute and specific weight; change of density, and colour; I shall leave to be treated of in another place; here it will be proper to note, that globules occur in the inflamed (hepatized) substance of the spleen endowed with the smaller molecules, which are seldom provided with a smooth envelope, and elongated white corpuscles, the representation or form of which the reader will find in Plate 10, fig. 62.

*(To be continued.)*

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## XXXV.—OBSERVATIONS ON FIBRE.*

*By Martin Barry, M.D., F.R.S.,L. and E.*

The author observes, that in the mature blood-corpuscles, there is often seen a flat filament already formed within the corpuscle.

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* Extracted from the Annals of Natural History, in the Lond. and Edinb. Journal of Medical Science. In our next number, we intend offering some remarks with reference to this interesting subject.

In mammalia, including man, this filament is frequently annular; sometimes the ring is divided at a certain part, and sometimes one extremity overlaps the other. This is still more the case in birds, amphibia, and fishes, in which the filament is of such length as to constitute a coil. This filament is formed of the discs contained within the blood-corpuscle. In mammals, the discs entering into its formation are so few as to form a single ring; and hence the biconcave form of the corpuscle in this class, and the frequently annular form of the filament it produces. In the other vertebrata, the discs contained within the blood-corpuscles are too numerous for a single ring; and they consequently form a coil. At the outer part of this coil, the filament, already stated to be flat, often presents its edge; whence there arises a greater thickness of the corpuscle, and an appearance of being cut off abruptly at this part; while in the centre there is generally found the unappropriated portion of a nucleus; and hence the central eminence, surrounded by a depression, in those corpuscles which, from the above-mentioned cause, have the edge thickened. The nucleus of the blood-corpuscle in some instances resembles a ball of twine, being actually composed, at its outer part, of a coiled filament. In such of the invertebrata as the author has examined, the blood-corpuscle is likewise seen passing into a coil.

The filament, thus formed within the blood-corpuscle, has a remarkable structure; for it is not only flat, but deeply grooved on both surfaces, and consequently thinner in the middle than at the edges, which are rounded; so that the filament, when seen edgewise, appears at first sight to consist of segments. The line separating the apparent segments from one another is, however, not directly transverse, but oblique.

Portions of the clot in blood sometimes consist of filaments having a structure identical with that of the filament formed within the blood-corpuscle. The ring formed in the blood-corpuscle of man, and the coil formed in that of birds and reptiles, have been seen by the author unwinding themselves into the straight and often parallel filaments of the clot; changes which may be also seen occurring in blood placed under the microscope before its coagulation; and similar coils may be perceived scattered over the field of view, the coils here also appearing to be altered blood-corpuscles, in the act of unwinding themselves; filaments, having the same structure as the foregoing, are to be met with apparently in every tissue of the body. The author enumerates a great variety of organs in which he has observed the same kind of filaments.

Among vegetable structures, he subjected to microscopic examination the root, stem, leaf-stalk, and leaf, besides the several parts of the flower; and in no instance of phanerogamous plants, where a fibrous tissue exists, did he fail to find filaments of the same kind. On subsequently examining portions indiscriminately taken from ferns, mosses, fungi, lichens, and several of the marine algæ, he met with an equally general distribution of the same kind of filaments. The flat filaments seen by the author in all these structures, of both animals and plants, he states to be that usually denominated a *fibre*. Its appearance is precisely such as that of the filament formed within the corpuscle of the blood. It is known, he remarks, that discoid corpuscles circulate in plants; and it remains to be seen whether or not filaments are formed also in these.

By gradually tracing the fibre or filament above mentioned into similar objects of larger size, the author endeavours to show that it is not impossible to draw a line of separation between the minutest filament, and an object being to all appearance composed of two spirals running in opposite directions, and interlacing at certain regular intervals; an arrangement which produces in the entire object a flattened form, and gives it a grooved appearance. It is, in fact, the structure which, for want of a better term, he has called a *flat filament*. The edge of this filament presents what, at first sight, seem like segments, but which, in reality, are the consecutive curves of a spiral thread. A transverse section of such an object is rudely represented by the figure 8. This is also precisely the appearance presented by the minutest filament, generally termed *fibre*; and the author particularly refers to the oblique direction of the line separating the apparent segments in the smaller filament, in connection with the oblique direction of the spaces between the curves of the spiral threads in the larger one.

The spiral form, which has heretofore seemed wanting, or nearly so, in animal tissues, is then shown to be as general in animals as in plants. Nervous tissue, muscle, minute blood-vessels, and the crystaline lens, afford instances in proof of this. And if the author's view of identity in structure between the larger and the smaller filaments be correct, it follows that spirals are much more general in plants themselves than has been hitherto supposed; spirals would thus appear, in fact, to be as universal as a fibrous structure.

The tendency to the spiral form manifests itself very early. Of this the most important instance is afforded by the corpuscle of the blood, as above described. The author has also obtained an interesting proof of it in cartilage from the ear of a rabbit, where the nucleus, lying loose

in its cell, resembled a ball of twine, being composed at its outer part of a coiled filament, which it was giving off to weave the cell-wall;—this cell-wall being no other than the last-formed portion of what is termed the intercellular substance—the essential part of cartilage. These nuclei in cartilage, as well as those in other tissues, there is ground for believing to be descended, by fissiparous generation, from the nuclei of blood-corpuscles.

The author then describes the mode of origin of the flat filament or fibre, its reproduction, in various animal and vegetable tissues, which he enumerates. He conceives that each filament is a compound body, which enlarges, and, from analogy, may contain the elements of future structures, formed by division and subdivision, to which no limits can be assigned.

[Dr. Barry requests us to add the following, in connection with his memoir on Fibre, an abstract of which is given above.

The "white substance of the nervous fibre," surrounding Remak's "band-like axis," consists of filaments having the remarkable structure above described, and often curiously interlaced with one another, as though each of them had a spiral direction. In examining the substance of the optic, the olfactory, and auditory nerves, as well as that of the brain and spinal cord, Dr. Barry employed for the most part such as had been preserved in spirit; and, besides using extremely minute portions, he very often avoided adding any covering whatever—the weight of thin mica itself being sufficient to rupture or to flatten this delicate substance, and thus entirely prevent its structure from being seen. In the parts last mentioned, he finds red discs, which pass first into rings, and then into spirals. In fasciculi from the spiral cord, and surrounded by spiral filaments, he met with a "band-like axis," which perhaps corresponds to that of Remak in the nerves; but if so, Dr. Barry's observations go farther even than Remak's. The "axis" described by this observer was found by him to be susceptible of division into filaments. So also is the one described by Dr. Barry. But the latter adds, that each filament is a compound object, which enlarges, and, from analogy, may contain the elements of future structures, formed by division and subdivision, to which no limits can be assigned. The spermatoza, mentioned in the abstract, were from the epididymis of a person who had died suddenly. The depression noticed in their discoid extremity—corresponding apparently to the "sugient orifice" of some authors—is probably analogous to the source of new substance in other discs. In these examinations, Dr. Barry has generally added to the objects dilute spirit (sp. gr. about 0·940), containing about $\frac{1}{200}$th of

corrosive sublimate. Spirals from the leaf-stalk of the strawberry, after the addition of this reagent, were seen to have divided into parallel filaments having the same structure as those above described. Flax presented a quadruple coil of such filaments. In early states of voluntary muscle also, there were seen double and quadruple coils, evidently produced by the same means—division. Dr. Barry compares the appearance of the vegetable "dotted duct," in its several stages, with that of objects found in mould, in the cornea, in the crystalline lens, and in voluntary muscle, all of which are produced by associations of minute spiral threads. The distribution of the remarkable filaments above described is so universal, that they are found in silk, in the incipient feather, in hair, in the feather-like objects from the wing of the butterfly and gnat, and in the spider's web.

Dr. Barry informs us that he has had the opportunity of showing to several physiologists the principal appearances described in his memoir on fibre. And Professor Owen permits him to state, that he has exhibited to him spirals in voluntary muscle,—muscular "fibrillæ," having a flat, grooved, and compound form,—the filamentous structure of "white substance in nervous fibre,"—the vegetable spiral becoming double by division,—a coiled filament within red blood-discs,—and the incipient unwinding of the coil in coagulating blood.

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## Extracts and Abstracts from Foreign Journals.

[From *Müller's Archives*, 1842.]

*Dr. Vogt* makes some observations upon *the young of a Filaria which he found in the blood-vessels of a frog in large numbers*, and concludes, from his own and Valentin's observations, that these entozoa are deposited by the parent in the space between the liver and pericardium, whence they insinuate themselves into the larger blood-vessels, and circulate with the blood for some time, and are finally deposited on the surface of the intestines. In this situation they become, as it were, imbedded, and cysts of effused fibrine are formed around them, in consequence of the inflammation excited by their presence. In these cysts they live and grow, until they become mature, when they emerge from them to deposit their young, which run through the same course.

*Herman Meyer on the Structure of the Horny Integument of Coleopterous Insects.*—These researches were made in all parts of the horny case of the *Lucanus Cervus*. In the natural condition, the substance of this tissue is so hard and brittle, that it is impossible to procure thin slices of it for

microscopic investigation; this difficulty, however, is surmounted, if it is macerated for some days or weeks in a solution of caustic potass, especially in a warm place. The alkali removes the greater part of a peculiar brown matter, and leaves the remainder unaltered in form, of a greyish-yellow colour, and cartilaginous consistence, well adapted for examination.

It will then be found, that the horny case is composed of three laminæ, viz., an external and an internal cuticle, and a central fibrous tissue.

The external epidermis is composed of cells, not very closely attached to each other, about 0.007—0.010 millim. in length, and 0.005—0.006 millim. in breadth. Their nucleus is a little smaller than the cell itself, and has one or more nucleoli. The internal epidermis is very delicate, and the borders of the cells composing it, are with difficulty made out. They however appear to be more rounded than those of the external epidermis, and by their more close allocation, assume a more or less hexahedral form. Their diameter varies from the 0.005 to the 0.010 millim. No nucleus can be distinguished in them; but instead, a spiculum projects in an oblique direction from the centre of each cell.

All these spicula lean in the same direction; they increase in thickness from their point of insertion to the middle, and thence taper to a fine point. Their length is about 0.006 — 0.008 millim., and their greatest thickness 0.002 — 0.003 millim. Both the external and internal cuticle are formed of but a single layer of cells.

The remaining or central part of the shell will now be seen to be composed of a transparent material, marked throughout by numerous dark lines, which are readily ascertained to be formed by several rows of smaller lines parallel to each other, and placed at regular distances. The appearances thus afforded are occasionally very elegant. The mass is readily split into several laminæ, the thinnest of which will be found to be made up of little transparent columns, with sharply defined, dark, parallel borders. The diameter of these columns is about the 0.008 millim.; and the above described lines correspond to their borders. These columns or prisms are connected together by the interlacement of delicate filaments, which pass very obliquely from the sides of contiguous columns, attaching them to each other. The direction in which these columns are placed forms an angle of 45° with the surface of the laminæ which they compose. The number of these laminæ is very various; in some instances as many as sixteen have been counted in the thickness of the horny case. In portions which have not been macerated in the alkaline solution, a layer of pigmentary matter, homogeneous, transparent, is observable between the outer epidermis and the proper horny substance.

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In No. 2 of Müller's Archives for the present year, is a plate, with figures illustrating the mode of growth and structure of the confervæ found growing on frogs, salamanders, &c., by Dr. Hannover.

[From the *Comptes Rendus*, 1842.]

*Schultz's Researches in minute Vegetable Physiology.* This work contains:—

1. New researches on the universality of latex-globules in various families of plants; on the size, form, and quantity of the globules; circumstances upon which the greater or less milkiness of the fluid depends. The juices become more and more milky in proportion to the increase in number and diminution in size of the globules, and they are clearer as the globules increase in size and are fewer in number. Thus the latex of *Musa paradisiaca*, which is almost clear, has the largest globules with which M. Schultz is acquainted; these globules may be compared to the large blood-discs of *Batrachians*.

2. Researches into the seat of the various chemical matters in the latex. The globules contain a kind of adipocire, which he has named *(safifett.)* This substance, mixed with other constituents not readily separable, and principally with the organic substance of the emptied globule, constitutes what has been hitherto called wax, galactine, and resin. The globules float in a plastic, coagulable, diaphanous fluid, (which M. S. names *plasma*), and which contains caoutchouc, gum, sugar, and salts. The caoutchouc is formed by the coagulation of the *latex* of all plants, whether milky or not, but in variable quantity. The formation of this substance depends upon the separation, during coagulation, from the juice of a considerable portion of the globules, by the absorption of a porous substance; nevertheless, the caoutchouc of commerce still contains many globules, which may be recognized in a lamina submitted to the microscope. The caoutchouc of the figs *(Ficus elastica)* is worth nothing, in consequence of its imperfect separation from the globules, so that they continue mixed in large quantities with it, and render it tenacious, viscous, and less elastic. M. Schultz made experiments with the milk of the *Palo de Vaca*, which he received from Caraccas, with that of some *Euphorbiaceæ*, of *Ficus elastica*, and of *Asclepias Syriaca*, and with the clear latex of *Musa paradisiaca*, &c.

3. Researches on the transformation of the sap into latex. At first the sap contains gum, which is converted sooner or later into grape-sugar, which is again afterwards changed into cane-sugar. In some plants the gum undergoes but little change, and is always present in great proportion, as in the vine; in others, the metamorphosis does not pass beyond the change into grape-sugar, as in the birch; and in others, again, the greater part of the gum is very rapidly converted into cane-sugar, as in the maple. But the sap of this tree at first contains a large quantity of gum, especially in the autumn, but very little in spring, so that there is always some grape-sugar mixed with the cane-sugar.

The gum and sugar remain in the latex, and their solution forms the fundamental liquid of the *plasma*, in which the globules are formed after its aeration, The sap, towards the period at which the buds are bursting forth, shows a great disposition to the formation of globules.

The gum of the latex is, like that of the sap, similar to the gum of starch. The sugar of the latex is always grape-sugar.

4. New observations on the vessels of the latex and their kinds. In those plants in which the acid of the latex (which juice always contains an acid) is the gallic, as in the *Musa paradisiaca*; the distribution of the laticiferous vessels can readily be distinguished without any other preparation, by placing a portion of a living leaf into a solution of a salt of iron, which blackens the network of vessels, when it has penetrated the tissues as far as the latex.

5. Observations on the evolution of the laticiferous vessels, in the cortical layers of trees. Some trees acquire several layers in a summer; others require several years for the formation of one, which gradually increases in thickness, and others form an annual layer.

There is a great difference between the mode of formation of the woody and cortical layers.

6. Observations on the distribution of the latex in the contracted vessels, and the cellular parenchyma of the medulla, of the epidermis, of the hairs, &c.

*Donné on the Origin of the Blood-globules, their Mode of Formation, and their Destination.*—In blood there are three kinds of particles :— 1st. The red or blood-globules properly so called. 2nd. The white globules, which have not been well known until lately. 3rd. The chyle corpuscles.

The red globules are flat in every kind of blood; they are circular in that of mammifers; and elliptic in that of birds, fish, and reptiles. The elliptic globules alone present a solid substance in their interior: the existence of a central nucleus cannot be demonstrated in the circular globules.

Contact with water changes all the blood-globules into small spheres, and it is to this circumstance, unknown to ancient observers, that we must attribute the opinion of some of them respecting the spherical form of the blood-globules of mammifers, as well as the spherical shape which they supposed was present in the blood-globules of birds at the time of their formation in the embryo: this shape is only secondary, and is caused by the water which is made use of to dilute the blood, or to prepare the embryo of the egg.

The proper blood-globules of mammifers, or the circular globules, are entirely soluble in acetic acid; but the proper blood-globules of birds, fish, and reptiles are only partly dissolved by it; the internal substance or nucleus resists the action of this agent. All blood-globules, whatever may be their shape, or the class to which they belong, are soluble in ammonia, and insoluble in nitric acid.

The proper blood-globules, or the red globules, appear to be formed of a flattened vesicle, containing a solid substance or nucleus in the elliptic globules, and a fluid in the circular ones.

The anomaly which has been remarked in the blood-globules of *Camelidæ*, has reference only to their shape, and not to their intimate structure, which is exactly similar to that of the blood-globules of other mammifers. The white globules are colourless, spherical, with slightly

fringed margins, and as it were granular. They are present in the blood of all animals, and may be seen circulating in the blood within the vessels; their number is greater than might be imagined; they are burst by water, dissolved by ammonia, and shrivelled by acetic acid; they appear formed of three or four solid granules or corpuscles, enclosed in a vesicle.

These corpuscles measure only $\frac{1}{300}$th of a millimeter in diameter, and are exactly similar to chyle corpuscles.

Neither the mode of formation nor destination of the blood-globules has been hitherto known. The result of M. Donné's researches on this subject is as follows :—

The blood-globules are not all identical, nor in the same stage of formation; they do not all resist the action of chemical re-agents in the same manner; and the difference of their properties indicates that they are not all arrived at the same degree of development.

The corpuscles are the product of the chyle constantly poured into the blood; these corpuscles unite together by three or four, and become enveloped in an albuminous covering whilst circulating with the blood: in this manner they constitute the white globules.

When once these white globules are formed, they gradually change their shape; they become flattened, coloured, and the internal granular matter becomes homogeneous or dissolved; ultimately they are converted into the proper blood or red globules.

The red blood-globules themselves have only a limited existence. They dissolve in the blood at the expiration of a certain time, constituting the liquor sanguinis properly so called. Certain substances are susceptible of an immediate change into blood-globules, when mixed directly with the blood. Milk, which, from its organic constitution, as well as from its principal elements and physiological properties, has the greatest analogy to the blood, is best fitted to demonstrate this change.

Injections of milk into the veins of animals in certain proportions, produce no ill effect, and the nature of its globules allows us to follow and to recognize them everywhere.

Besides, observation proves, that these globules injected into the vessels are immediately changed into blood-globules by the same mechanism which causes chyle corpuscles to become white globules, and these latter to be transformed into red globules.

The spleen appears specially destined to effect this change; for it is in this organ more particularly that we find the greatest number of white globules, in every state of formation.

The examination of the circulation in the most vascular organs, does not show that the blood-globules leave their vessels for the purpose of combining with other organs, or with organic elements; but the fluid part of the blood passes through the vascular parietes, and constitutes probably the essential organizing medium.

In conclusion, young animals, when brought up on other substances than milk, are less perfectly nourished than those which are left completely to nature; and the influence of an inappropriate nourishment, may go far towards altering the shape and nature of the blood-globules.

*M. Tristran's third Memoir on Phytology.*—This memoir is confined to the study of the spiral and large sap vessels.

The author considers that certain spiral vessels have originally been formed of a simple membrane, which is afterwards cut down into a helix; but he maintains that other spiral vessels, or tracheæ, are originally formed by one or more filaments which grow at their extremity, turning in a helix, and to these there may *afterwards* be added a membrane, which unites the turns of the spiral. He considers that the position of the tracheæ is too much restricted, when they are supposed to be confined only to the medullary sheath. He believes that plants *(à faisceaux didynames)* should be considered as having their tracheæ in the thickness of the ligneous substance. In other plants he shows the elements of the tracheæ (under the name of scattered filaments) even in the external ligneous layers of the stems of several years growth.

With respect to the sap vessels, he endeavours to recognize the more essential features of their different forms, with a view to their classification, according to a natural method; but there is so much obscurity still on this subject, that the author conceives that it is necessary to adhere at present, at least provisionally, to an artificial method, which he proposes.

*M. Arago* presented to the academy a microscope, manufactured by Lerebours, and furnished with achromatic lenses of very short focal distance, executed by M. Nachet. One of these lenses was ground in a curve, the radius of which was half a millimètre.

*M. Grüby "On the Entozoa of the Frog, and on some Points in the Pathology of that Batrachian."*.—M. G. remarks that

"The existence of several species of entozoa in different parts of the bodies of frogs, is known to every one; he himself has observed them frequently in the urinary bladder, in the cellular tissue which surrounds the subclavian veins; in the lungs; in the intestines, and in the cellular tissue of the peritoneum. In the latter situation the worms were enclosed in small pouches of $\frac{1}{8}$ to $\frac{1}{4}$ of a millim. The pouches being transparent, enabled M. Grüby to see the entozoa within them manifesting every sign of vitality: these were of the genus *Filaria*, and their different parts could be readily distinguished. He saw the ova of this entozoon not only circulating in the vessels with the blood, but saw them also in the spinal canal. He observed some *Ascarides* within the sheath of the nerves, among the primitive nervous fibrillæ. The length of these worms was from $\frac{1}{50}$ to $\frac{1}{40}$ millim.; their width $\frac{1}{200}$ millim.: they were transparent, and moved slowly.

In the lungs, they were lodged in the air cells, surrounded with a yellowish, firm substance, presenting under the microscope, all the characters of tuberculous matter.

Desirous of studying the cause of the formation of these tubercles in the lungs of the frog, he injected ovula into the blood of this animal, and observed that some were arrested in the capillary net work of the lungs, and some in that of other transparent portions of the body. He

was at the same time enabled to appreciate all the changes which the ova produce in the different tissues, and also the changes which the ova themselves undergo, and so follow as it were, under the most favourable circumstances, their developement. Among the embryogenic facts which he was thus able to determine, he cites the formation of the three envelopes of the embryo, the manner in which the vitelline cells become grouped to form the macula germinativa, and, finally, the development of the embryo itself, and the movements it performs in its transparent ovum.

Observations on the alteration of the tissues in which the ovula may be lodged, is soon interrupted by the effusion of coagulable matter, which prevents further microscopic examination. In the lung he observed the pathological products to be deposited around the ova, and giving rise in this way to the tubercular appearance mentioned above.

M. Grüby injected the ova of many species of entozoa, but without success with the majority. He succeeded best with the ova of a species of *Monostoma* (*Distoma ?*) which is frequently found in the bladder of frogs.

M. Grüby presented to the academy various pathological productions, chiefly relative to the frog, and the development of which was owing to the presence of entozoa.

1. Pulmonary vesicles, filled with tubercular matter.—This was a portion of the lung of a frog filled with tubercular matter, presenting all the physical and anatomical characters of tubercle in the human subject, and the development of which was the consequence of the deposition of the ova of entozoa in the lung.

2. Tubercular matter of the pylorus (of the frog?) by which that orifice was much contracted, and also caused by the deposition of ova between the peritoneum and muscular coat. And several others which do not appear to have any connection with this exciting cause.

*M. Bourgery's Researches on the Intimate Structure of the Lungs in Man and the Mammalia.*—These researches, embracing many divisions of the subject, are related in as many special memoirs, and include—

1. The normal microscopic anatomy of the lungs, and its physiological application.

2. The morbid microscopic anatomy.

3. Anatomico-physiological inquiries as to the general form of the pulmonary vessels.

4. Physiological experiments on the capacity for air and the degree of permeability of the lung to air, under different conditions, in the two sexes, and at different ages.

The first memoir relates to the first of these subjects, and commences with the description of the minute anatomy of the air tubes. When M. Bourgery commenced his investigations, there existed three theories as to the intimate structure of the aerian capillaries, referred respectively to Malpighi, Willis and Helvetius. Malpighi (1661), who was the first to discover the membrano-cavernous structure of the lungs, con-

ceived that the functional tissue of these organs was formed by an almost infinite number of orbicular and sinuous vesicles, all communicating with each other. Helvetius (1718), with some difference of view as to the nature of the tissue, admitted with Malpighi the existence of cells opening into one another, within each lobule, but denied the communication of cells in different lobules. But, before him, Willis had represented the pulmonary tissue as being formed of prolongations from the ultimate ramifications of the bronchial tubes, not communicating with each other, and which radiate towards the periphery, where they terminated in a blind extremity. This theory has since gained much favour, under the name of that of Reisseissen.

M. Bourgery considers, as a previous question of great importance, that which relates to the mode of preparation of the lungs: Malpighi and Helvetius principally studied the lung when inflated; Willis, Reisseissen and his followers chiefly used injection with mercury. These two exclusive modes of preparation explain the difference in the theories which have occurred to different observers. M. B. himself has employed all sorts of injection, but is of opinion that the lung is best studied when dried and inflated, with the vessels injected, this mode allowing the deeply-seated canals to be seen, as well as those at the surface, which only, are visible when opaque materials for injection have been used.

When the lung thus prepared is examined under the microscope, it is seen to be composed of minute sinuous canals, in the walls separating which the blood-vessels are situated. The appearance of these canals is everywhere the same, whatever may be the inclination, with respect to the pleural surface, of the section by which they are exposed. All are equally various in direction; the greater number, however, are more or less perpendicular to the surface; but others are occasionally met with parallel, or horizontal, and being divided longitudinally, present the appearance of a groove or gutter. All these canals are exceedingly tortuous, and communicate with each other at their sides and at their extremities, by a vast number of openings.

Such are, according to M. Bourgery, in general, the true aerian capillary vessels of the lungs. These sinuous canals, opening into each other and turning in all directions, forming by their involutions an intricate mesh, through which the blood-vessels pass, convey the idea of a minutely divided space with innumerable tortuous branchings, and uninterruptedly continuous in all parts, having no termination but the entrance into it, which is at the same time the place of exit: it is, in fact, the image of a true labyrinth, in three of its dimensions, and this consideration has induced M. Bourgery to name these tubes the "*labyrinthine aeriferous canals*," in order to distinguish them from the "*ramified canals*," which constitute the termination of the bronchial tree. In order to comprehend the latter, we must refer to the mode of composition of the lobules. Each of these bodies commonly receives a single central bronchial branch, which forms the common trunk of its subsequent divisions, and extends to the peripheric extremity of the lobule. Starting from this central trunk, which gradually decreases in size, the secondary ramusculi which constitute the *ramified bronchial canals*, arise

in alternate succession, and radiate in a stellate manner; these are the ultimate expansion of the tracheal tree. Each of these tubes terminates in a small irregular, sinuous dilatation, elongated, and either single, bifid or trifid, pierced in each of its compartments by one or more orifices of the *labyrinthine* canals, and opening finally into one of these which thus forms a continuation of the original canal.

M. Bourgery proceeds to the description of the sanguiferous capillary system.

There are two kinds of pulmonary capillaries which appear to have a corresponding difference in their functional destination. The one of these is formed of an endless chain of annular vessels, and, speaking comparatively, of considerable size. The other consists of a membranous network of very minute capillaries, which fill the areolæ of the larger vascular rings.

1. The *annular vessels*.—These vessels are enclosed between the walls of the air tubes. Their form and their anatomy are always the same. A radical arteriole represents a stem, the divergent branches of which form a cone or tree. Two principal ramifications arise from it and penetrate the intercanalicular septa " en interceptant un premier canal rétréci dans l'espace triangulaire qui le renferme." Beyond this they surround the contiguous (aeriferous) canals by as many polyhedral or circular rings formed by a single vessel. The same disposition is repeated at short distances, all the canals being as it were thus surrounded by annular vessels, interposed in their septa, of from $\frac{1}{3}$ to $\frac{1}{5}$ of their volume ($\frac{1}{16}$ to $\frac{1}{25}$ mill.) which anastomose with each other, at the points where the circular turns touch back to back, or at the points of intersection. At the other extremities the annular vessels by their junction again form branches, the inosculations of which constitute venules; so that on a section either between two branches arising from an arterial trunk, or from two neighbouring arteries, or in the intermediate space between the arteries and venules the surface is formed by a network of these annular vessels, communicating with each other, or rather continuous everywhere without interruption, and becoming less in diameter from the branches towards the central point of junction. The general aspect of this surface, penetrated in all directions by the canals, which are bounded by the vascular septa, resembles a net. The same disposition obtains at whatever inclination the sections may be made.

2. *Net-work of minute capillaries*.—This system of minute vessels, is placed within the membranous wall itself of the aerian capillary canals, both the bronchial ramified, and the labyrinthine branches. It is seen then, at the surface separated from the atmospheric air, in the normal state, merely by a very delicate expansion of membrane, and it is situated on a plane more superficial, than the annular vessels which run in the intercanalicular septa.

In order to comprehend this system of the minute capillaries, it is necessary to consider it under two aspects, first, in minute distinct fractions, and, second, as a whole.

1st, Considering it in parts. It occupies the areolæ formed by the annular vessels and their anastomosing branches, and forms in the

internal aerian membrane as many small reticulated surfaces as there exist polyhedric areolæ between those vessels. Anatomically, this net-work is composed of an uncertain number of minute branches of a third or fifth of the size of the annular vessels, into which they open at various points of the circumference of the area enclosed by the latter, and divide into very delicate ramusculi, which are lost in a net-work of still more minute capillaries of uniform size, and about $\frac{1}{100}$ mill. in diameter, and by which minute net-work the whole surface is covered. These capillaries anastomose frequently with each other, and form so close a texture that the spaces between them, even under high magnifying powers, appear only as points.

2nd. Considered as a whole. The little polyhedric spaces above described anastomose with each other at their borders, and constitute by their junction a vast surface of capillary net-work, occupying the full extent of the pulmonary air membrane.

*Intercanalicular septa.*—These constitute the intervals which separate the canals.

Their thickness varies from $\frac{1}{4}$ to $\frac{1}{2}$ of the diameter of the canals, and they are composed of two small (petites) membranes, segments of the circular walls of two canals, and between them are enclosed the annular vessels and the minute labyrinthine canals.

*M. Dujardin's "Complete Manual for the Microscopic Observer."*—This work, which is quite original in the choice of the designs, of which it is composed, and in the mode of view expressed in these designs, is intended to show how the details of a great number of "test objects" may be seen at the present time with the most perfect microscopes; and it is at the same time a collection of abundant materials serviceable for the study of the intimate structure of organized bodies. The author has attempted to demonstrate by correct figures the true constitution of the blood globules, or corpuscles, which when deprived of external membrane, can be agglutinated, drawn out and deformed in various ways under the influence of reagents; and has endeavoured to show that the nucleus which belongs only to the blood globules of birds and other oviparous animals, is nothing else than the first degree of alteration. He also believes that he has demonstrated the true origin of the spermatozoa, or pretended spermatic animalculæ. He has represented the mode in which these bodies originate in the mucous covering of the tubuli seminiferi, or in mucous globules, which soon become isolated, and which have been mistaken for vesicles. He proves also that in certain circumstances, the fibres or lamellæ of the crystalline lens are transversely striated or grooved, a marked indication of their contractility. The figures representing the modifications which the nervous substance undergoes when in contact with water, will serve to show, as the author expects, the slight foundation upon which is based the opinion which admits of nervous filaments originally provided with enlargements (varicose fibres).

A great number of figures are intended to represent the true structure of the muscular fibre, examined in the whole animal series, and under different degrees of alteration. Hairs, scales and various epidermic pro-

ductions are the objects of numerous designs, by which it will be shown that those hairs of vertebrata which continue to grow, are provided with an external scaly envelope, and that their interior is homogeneous, fibrous, and sometimes furnished with a canal, whilst, on the contrary, those of definite growth are hollow in the interior, or provided with aeriferous cells, as are feathers, the relation of which, to the hairs of certain *Rodents* will be easily perceived. The hairs or scales of the Articulata are formed essentially of a flattened membranous vesicle, filled with air, and more or less folded or striated. Ivory, teeth, the vibratile cilia of mucous membranes, &c., are also figured as they appear under an excellent microscope. The author has also represented vegetable organs and tissues, woody fibre, vessels, starch, pollen, &c. In the execution of these figures, he has represented the objects, such as they appear to an experienced eye, through a good microscope with magnifying powers of 300 to 400 diameters. He has been careful to note the modifications of appearance caused by different modes of éclairage, and the greater or less distance of the objective. It is known that the influence of these circumstances may be such that the same object will appear full or empty, convex or concave, to different observers who do not pay sufficient attention to them.

Several figures are given of the different appearances which one and the same object may present under these circumstances.

*Report on a Memoir by M. Doyère, relative to the Revivification of Tardigrada and Rotifera.*—Shortly after the existence of swarms of animalculæ in water containing organic matters, had been revealed by the microscope, the use of that instrument led to the discovery of another fact, equally unexpected, and more difficult of comprehension, in as much as it still more widely differed from all the results heretofore arrived at from the study of animated beings. In fact, by the examination of dry dust collected from a gutter, Leuwenhoeck ascertained the existence of an animal which, under the influence of desiccation, ceased to move, lost its form, and no longer gave any signs of life, and which, in this condition, appeared to differ in no respect from a dead body, as it were mummified, by being deprived of the fluids necessary for all animal existence, and yet which, after having been preserved for a long period in this dried condition, was restored to life by contact with a drop of water. Leuwenhoeck did not perceive the whole extent of the singular fact which he had thus discovered, with respect to the Rotifer of house roofs, and did not pursue his researches further on this subject; but a phenomenon of this kind could not fail to excite lively curiosity among zoologists, and to give rise to long controversies, as well as to interesting experiments. It may be remarked that the discovery of Leuwenhoeck soon ceased to be an isolated fact in science, for Needham announced that the eels of mildewed corn possessed, like the Rotifera, the faculty of reviving after having been completely dried; and Spallanzani arrived at the same result, after observation, not only of the Rotifera and Anguillula, but also of another microscopic animalcule, to which he gave the name of Tardigrade (R. tardus).

The investigations of this skilful observer were numerous and con-

ducted with the profoundly scientific spirit which characterizes all his labours, and might perhaps have been deemed sufficient to convince naturalists as to the truth of the fact, and to serve as a basis to subsequent inquiries.

But the results thus obtained carried little weight, and it would be easy to give a long list of naturalists, who, even at present, deny in the most positive manner, what has been termed the *revivification of Rotifera*.

Latterly, it is true, M. Schultz has successfully repeated some of Spallanzani's experiments, and has furnished many naturalists with the opportunity of making similar researches; but still more lately, M. Ehrenberg has added the weight of his great authority to the opposite opinion, and having formally rejected the opinion of Spallanzani, has attempted to explain the way in which an error of the kind could find its way into science.

This interesting and much debated question, then, could not be considered as definitively settled, and appeared to demand further investigation. It was necessary to examine carefully all the circumstances attending the phenomena described by Leuwenhoeck, Needham and Spallanzani, to submit to the proof of experiment, the objections and hypotheses presented by others, antagonists of these celebrated observers, and to acquire new facts by which one or other of the contradictory opinions of naturalists might be supported or refuted. This difficult task has been undertaken by M. Doyère.

The *Rotifera* and the *Tardigrada* are found, as is well known, in the moss growing upon roofs, or in the sand found in the gutters of the roof, and are seen in the living state, when these matters, after having been for a long time dry, are wetted with water. The fact of the appearance of these animalculæ in a living state in dust which had been dry during months, or even whole years, can no longer be disputed, and it is equally well demonstrated that, with these minute beings as with animals of a higher class, evaporation of their fluids, carried to a certain extent, induces the abolition of every sign of vital motion. The partizans of Spallanzani's opinion regard the reappearance of these living beings as a sort of resurrection; and the advocates of the contrary opinion think that the phenomena may be explained in a simpler manner; the opinion of some is that the Rotifera, &c., are of an amphibious nature, and capable of living in dry air as well as in water or sand, where the moss with which they are surrounded would preserve them from too complete desiccation, so that in fact, in the above cited instances, the active state of the animalculæ would never even be interrupted, and these little animals buried in apparently dry dust, would still meet with sufficient humidity to prolong their lives and to allow of reproduction, so that those which have been supposed to become revivified would be in reality, to use the expression of M. Ehrenberg, only the great-grandchildren of those observed in the same material at the commencement of the experiment. According to other naturalists, the desiccation of the sand or moss containing the Rotifera, would infallibly kill the animals themselves, but would not destroy the vital principle in the ova which they may have deposited, and, consequently, instead of witnessing the resurrection of the animals themselves, we only see the

ova rapidly developed by the influence of the water, and giving birth to animalculæ whose growth would be equally rapid.

Finally, there are other physiologists who consider that the Rotifera, &c., of dry sand do not undergo a complete desiccation, but such a degree of it only, as to plunge them into a sort of torpor, and conceive that these animalculæ, although to all appearance dead, yet preserve a latent life, but still a real life sufficient to establish a bond of connection between the active life which precedes the evaporation of the fluids, and that equally active, when they are restored by the addition of humidity to the full exercise of their functions.

The observations of M. Doyère overturn all these hypotheses, and confirm in the clearest way, the results obtained by Spallanzani:—

Thus, in answer to the arguments employed by Ehrenberg, it is sufficient to observe, that living Tardigrada are never found in the dry dust of gutters, but that, by the aid of the microscope, corpuscles can be seen which entirely resemble the dead bodies of these animalculæ, deformed by desiccation, and that in matters where no living being was previously discernible, living Tardigrada frequently appear on the addition of a little distilled water. M. Doyère is even assured that it is not impossible to revivify these animalculæ, if taken one by one and dried separately on pieces of glass, without being surrounded with sand or other material, organic or inorganic, capable of preserving them from the ordinary effects of evaporation.

In his experiments he has been able to count them, and to trace in each separate individual all the phases of desiccation; to observe them gradually assume the appearance of dead bodies, and to determine afterwards that these same bodies, dry and brittle, are susceptible of reassuming their primitive form, and of returning to life under the influence merely of a few drops of water.

This experiment appears to be decisive; but it may still be asked, whether the drying which the animalculæ have undergone has been complete, and if the privation of all the water contained in their tissue, would not render them incapable of resurrection, after having in this way passed years in a state of apparent death?

In order to determine satisfactorily this highly interesting physiological question, M. D. had recourse to the most powerful means of desiccation employed by chemists in the analysis of organic substances.

He suspended for five days, in the vacuum of the air-pump, over a vessel containing pure sulphuric acid, some Tardigrada surrounded with sand, or uncovered and dried upon slips of glass; and he left others during thirty days, in the Torricellian vacuum, dried by chloride of calcium; and in all these instances he obtained some resurrections. These results are of great importance towards the solution of the question which M. Doyère had proposed to himself; but he still conceived that they might be considered as offering only a strong probability in favour of the complete desiccation of the animalculæ, in which the faculty of becoming revivified was retained; he continued his experiments, and by studying the influence of elevated temperatures upon these singular beings, he arrived at the discovery of the most decisive and surprising facts.

It is known that animals perish when their temperature is raised above a certain limit, inferior, however, to that at which the white of egg coagulates, and which, in the majority of cases, does not exceed 50° cent. (122° F.) Animalculæ capable of resurrection are not excepted from this law; M. Doyère is satisfied that the Rotifera and Tardigrada perish when the water in which they swim is heated to 45° cent. (105° F.) and that they cannot then be recalled to life by any means. But he has found that this is not the case when the animalculæ have been previously dried. If, instead of experimenting upon Tardigrada in full life, it is done upon individuals which have lost all their humidity by the ordinary means of desiccation, and which appear as dead, it is possible, without depriving them of the faculty of reviving, to raise their temperature to a degree which would necessarily involve the disorganization of all living tissue containing any water beyond that chemically combined with its constituent principles. In an experiment repeated in the presence of the Commission of the Academy, a certain quantity of moss containing Tardigrada, after having been properly dried, was placed in a stove, and around the bulb of a thermometer, the stem of which extended out of the apparatus; heat was gradually applied, until the thermometer thus placed in the centre of the moss, indicated a temperature of 120° cent. (248° F.) This considerable heat was maintained for several minutes, nevertheless, some of the animalculæ contained in the moss returned to life, and appeared in their usual condition after they had been placed for 24 hours in a suitable degree of moisture. In other experiments, M. Doyère submitted some dried animalculæ to a heat of more than 140° cent. (284° F.), and still witnessed some of them revive after immersion in water. These facts are in themselves of considerable importance towards the solution of the question at issue, and the result without doubt depends npon the circumstance first pointed out by M. Chevreul, that albumen, deprived of its water by previous drying, can be submitted to a much higher temperature without, in consequence, losing its solubility, than it could be if exposed to the same temperature in the moist state; and from the simple fact that a Tardigrade exposed to the action of a temperature of 120° c. (248° F.) can still be made to revive, it may be concluded, with great probability, that the whole of the water chemically free in its body had been dissipated, a degree of desiccation which would preclude all idea of vital movement. Thus the Tardigrada and Rotifera, when dry and retaining the property of living when moistened, cannot be considered as actually alive, and their mode of existence can only be compared to that of a seed, which is organized so as to live, and which will live when exposed to the influence of air, of water and of heat, but which, in the absence of one of these excitants, manifests no sign of activity or life, and can be preserved thus for ages, although the duration of its real life may not exceed perhaps a few weeks.

M. Doyère has also given a detailed and excellent account of the anatomy of these animalculæ, including, especially, the nervous and muscular systems; and his work is illustrated with beautiful and exact figures.

## Microscopical Memoranda.

*E. J. Quekett on Vegetable Fibre.*—"I perceive that in the number of the Microscopic Journal for May last, it is mentioned that "an error has been pointed out" respecting the date of my having made some observations on a peculiar vegetable structure, visible in a certain specimen of coal; and it is stated, that the object of correcting such was, "because it involves a question of priority as to two discoveries, the one by Dr. Barry in recent vegetable structure, the other by Mr. Quekett in the remains of vegetable fibre found by him in a specimen of coal and of silicified coniferous wood."

The date of the observation was certainly wrongly given in the Journal, being one year too early; but in mentioning the subject, I had not the slightest idea of doing so with a view to claim any priority in the discovery, but merely to exhibit the perfect state of preservation of a singular tissue in a specimen of coal.

If the statement made by Dr. Barry in December last, for which he claims a priority of observation, be contrasted with that made by myself in March last, it will be obvious that the observations of Dr. Barry do not appear to have reference to the same fact as my own; his relate to the *structure* of the fibre of a vessel of a plant, and mine to the *arrangement* of the fibres irrespective of structure.

Dr. Barry states (No. 51, p. 364, Proc. of Royal Soc.), that the apparently simple "fibre"—(vegetable or animal), "being to all appearance *composed* of two spirals running in opposite directions and *interlacing at certain regular intervals*,"—"a transverse section of such an object is rudely represented by the fig. 8."

Contrast this statement with that to which I am reported to have made, viz., "where there are more than one row of dots on each (woody) fibre, these dots appeared to be formed by two spirals wound in the *interior* in different directions, the *turns of each* connected at intervals by *longitudinal* bands, thereby leaving a transparent space by such ar-arrangement." Nothing is here stated of two spiral fibres interlacing with each other, but that the *turns* of either spiral are connected to each other by longitudinal bands, and not that one spiral fibre interlaces with the other. In fact, if a section of the tube containing the fibres be made transversely, it would not in any respect resemble the figure 8; but would exhibit the plan as if three cylinders were placed one within the other, the outer entire, the inner two perforated with oval holes, in one taking the direction of a right-handed, and in the other of a left-handed screw, the holes (dots) being formed as before stated.

As regards the apparently simple fibre of an ordinary vessel of a plant "being to all appearance composed of two spirals running in opposite directions, and interlacing at certain regular intervals," is a structure

which, in the recent tissue, I am unable to see* or comprehend; if it be only to be observed under the effects of decomposition or chemical reagents, then it is possible that appearances so produced may be delusive.

The fact of two spirals occurring in the same tubes or cells, is known to every vegetablea natomist. Many species of Jungermannia possess elaters of this structure; and in the wood of the yew, the same has been noticed years ago; but in neither case, nor in any *recent wood* that I have ever examined, is a structure to be found precisely like that to be seen in the coal which I exhibited. The nearest instance occurs in the wood of *Drimys Winteri*, which I believe was first noticed by Dr. Robert Brown. Therefore I trust the justice will be done me, to allow this statement to contradict that part of the paragraph in the Journal, viz., "it will be obvious that Mr. Quekett was mistaken when he stated his belief, in reference to his own observation, that 'nothing analogous had hitherto been detected in recent woods.'"—*Letter to the Editors.*

[The mistake as to the date of the meeting of the Microscopical Society, at which Mr. Quekett's observations were made, is sufficiently obvious; and with reference to the supposed coincidence of Dr. Barry's and Mr. Quekett's description of vegetable fibre, the above letter renders it quite evident, if it were not so before, that the observations and descriptions of these gentlemen regard two entirely different objects, and in no respect interfere with each other. Dr. Barry refers to the supposed structure of what he terms elementary fibre, and Mr. Quekett's to the mode of arrangement of an organ which may or may not be composed of Dr. Barry's double spiral filaments.]

*On the Extent of the Ova of an Acarus.*—It may be interesting to microscopic observers to be informed, that the pebbles of the gravel on Blackheath and the neighbourhood, are at the present time abundantly covered with the ova of the Acarus lately described by Mr. White, and formerly considered as a fungus under the name of Craterium pyriforme.

Before the late rains, these bodies were to be seen on pieces of wood and many other substances, as the stalks of plants, &c., as well as on the pebbles. We have lately seen specimens of the same deposit on pebbles, from Lincolnshire and from Devonshire or Cornwall in the neighbourhood of Plymouth; from which it would appear to be very generally distributed throughout the country. It may not improbably perhaps prove to be the ovum of the harvest bug, (*Acarus Autumnalis* of Shaw.)—E. M. J.

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* I have examined the fibre of the spiral vessels of the strawberry leaf, placed in a solution of corrosive sublimate and diluted alcohol, as recommended by Dr. Barry, but have not yet been able to discover the bi-spiral character of the filaments.—E. J. Q.

## XXXVI.—REMARKS ON THE STRUCTURE OF FIBRE.

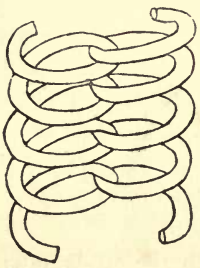
*By the Editors.*

THE abstract of Dr. Barry's views on the spiral structure of animal and vegetable tissues, which was given in our last number, would hardly, perhaps, convey a sufficient notion of the extent to which they reach; to understand which, it will be as well to peruse the catalogue of the parts in which Dr. Barry has observed the same kind of filaments, as given by him in the Philosophical Transactions, viz.:—

"The cortical and medullary substance of both the cerebrum and cerebellum, the spinal chord, the optic nerve and retina, the olfactory and auditory nerves, nerves connected with the spinal chord, voluntary and involuntary muscle (the latter including muscle in all parts of the alimentary canal, and the Fallopian tube and uterus, as well as blood-vessels, the iris, and the heart), tendon, elastic tissue, cellular aad fatty tissue, serous membranes (peritoneum, pericardium, and arachnoid membrane), various parts of the so-called mucous membrane, the lining membrane of the large blood-vessels, and the valve of a large vein, the skin, the dura mater, and the sheath of the spinal chord, ligament, the gums and palate, the stroma of the ovary, the testis and the walls of the vas deferens, the kidney and ureter, the glans as well as the corpus spongiosum and corpus cavernosum penis, the coats of the gall-bladder and of the cystic duct, the pancreas, and the liver. He found them along with the marrow from a bone, between the rings of the trachea, as well as in the substance of the lungs, and the gills of the common Mussel, in the parenchyma of the spleen, the lacrymal gland, the sclerotic coat of the eye, the conjunctiva, the cornea, the membrane of the vitreous humor, the capsule of the crystalline lens, the lens itself, the cartilage of the ear and cartilage of bone, bone itself, the periosteum, the claw of the bird, the shell membrane of the egg, substance connecting the ova of the crab, silk, hair, the incipient feather, the feather-like objects from the wing of the butterfly and gnat, and the spider's web."

These are the principal of the animal structures in which Dr. Barry has found filaments such as he describes. Of plants he subjected to microscopic examination, the root, stem, leaf-stalk, and leaf, besides the several parts of the flower: and in no instance where a fibrous tissue existed, did he fail to find filaments of the same kind, as well in Phanerogamous as in Cryptogamous plants. The flat filament seen by him in all these structures of both animals and plants, is that usually deno-

minated a "fibre," and described in our last No., p. 238. He conceives "this filament to be in fact composed of two spirals running in opposite directions, and interlacing at certain regular intervals;" and we are desirous here of drawing attention to his remark as to the oblique direction of the line separating the apparent segments in the smaller filaments, in connection with the oblique direction of the spaces between the curves of the spiral threads in this larger one, as it will be found of some importance when we speak of the ultimate structure of muscle.



The mere perusal of the catalogue of parts given by Dr. Barry, as the principal of those in which he has observed these peculiar filaments, is sufficient to prove how extensive such a structure must be, and consequently how important it becomes in all inquiries connected with the minute structure of bodies, to determine whether his views are correct, or whether he has not been misled by erroneous and easily misinterpreted appearances, in objects so minute and so indefinite in structure and consistence, and so readily altered by slight causes, as many of the tissues he enumerates, obviously are. It is somewhat humiliating, however, in the present comparatively advanced state of microscopical observation, to find, that such extraordinary facts as those adduced by Dr. Barry with regard to the structure of bodies so familiar as most of those in his list are to all, who have employed the microscope to any extent, should even admit of dispute; and, on the one hand, that if false, their truth should, to a certain extent, have been admitted by many whose opinions justly bear great weight in questions of this kind; or, on the other, that if true, they should have been equally repudiated by others, who have enjoyed equal opportunities of accurate investigation, and been animated with the same desire to arrive only at the truth. Such, however, is the case. We, among others, have repeatedly and carefully examined most of the parts and objects enumerated in Dr. Barry's list, with the aid of microscopes of the best construction the present day will afford, and have been unable, in a single instance, to satisfy ourselves of the existence of fibres or filaments, having the structure described by Dr. Barry. Appearances, however, have been frequently met with, which, by imperfect eclairage, or other accidental circumstance, might readily be interpreted, as they have been by Dr. Barry.

Our limits will not allow us to pursue the subject through the whole of Dr. Barry's list, nor even to touch upon all the sections of his paper;

and we shall confine ourselves at present to the consideration of the supposed formation of the filament within the blood-discs, and to some few observations on the elementary structure of muscular fibre,—two of the most important points, perhaps, to which Dr. Barry's hypothesis refers; and it may be reasonably inferred, that, if it can be shown that the appearances he has remarked, as leading to the conclusions he has drawn, may be otherwise and more satisfactorily explained, in these two instances, less reliance can be placed in the truth of his views, applied to many other of the objects enumerated in his list. With regard, however, to one item contained in it, and that the last, we cannot, before proceeding further, refrain from adverting to the most extraordinary supposition as to the mode of formation of the spider's web. Is it possible that Dr. B. can be understood to say, that the spider's web is wound up within its body like a ball of twine, and unwound as occasion may require?

The first section of Dr. Barry's paper refers to "the formation of a flat filament within the blood corpuscle;" and as his theory of the formation of almost all animal tissues, and especially of muscular fibre, depends upon this, it would appear to demand our chief attention.

In the wood-cut here adjoined, are figures of blood-corpuscles in various stages of alteration. The three uppermost figures to the right hand, and lettered *c*, *c*, *c*, are copied from Dr. Barry's figures in the Philosophical Transactions, and are given by him as instances of the formation of a filament, "frequently annular, and sometimes having the ring divided at a certain part," which filament is stated "to be composed of the discs contained within the blood-corpuscle." Now, that the margin of a blood-disc, when shrunk by exosmosis, or altered in form by the granulation of its contained fluid, will assume a crenate appearance in whole or in part, is well known; and it is equally well known, that under certain circumstances, the discs become contracted into the form of a cup.* The other figures are intended to show the appearances presented by the majority of the blood-discs contained in fluid ejected by a man from the stomach; and the alteration of form presented by these blood-discs, would seem to throw great light upon the apparently annular formation given in Dr. Barry's figures. Fig. *e* is that of an unaltered

* This appearance is described by M. Gulliver, Append. to Gerber's Anatomy:—"They are often swollen at the edges, which in consequence project towards the

blood-disc, having the natural, flattened, concave aspect, with the margins of course thicker than the centre; and it will be observed, that the diameter of this disc is greater than that of any of the other more or less annular ones. It is very clear, that the change of size and appearance in the latter, is entirely owing to an alteration in the shape of the blood-discs, which have assumed the form of a cup, or rather saucer, the prominent edges of which, by their greater refractive power, owing to their greater perpendicular depth, necessarily appear as a bright ring around a darker area. That this is really the case, is proved also by the side-view of the same or similarly altered blood-discs, which are represented by the three crescentic figures (without letters), between the horns of which the faint shadow of the distant edge of the cup could be distinguished by careful adjustment of the light. Now the resemblance of these rings and crescents, with those figured by Dr. Barry, is sufficiently obvious, to render it needless to insist upon the conclusion, that in all probability the appearances are dependant in each on the same cause, viz., a contraction into a cup-like form of the naturally flattened biconcave blood-disc; the apparent diameter of which is necessarily lessened in proportion to the contraction.*

But, if it should really be the case, that the supposed rings formed by the blood-discs are in fact nothing more than the turned up edges of those discs which have assumed a cup-like form: this circumstance alone, would involve an important part of Dr. Barry's views with regard to the primitive formation of muscular fibre. In a former paper in the Philosophical Transactions, 1840, Part II., p. 605, he describes the formation of muscular fibre, as observed by him to take place from blood-corpuscles, mixed with mucus expressed from the Fallopian tube of a rabbit (an extraordinary situation, at all events, for the generation of muscle); and in his recent paper in the Philosophical Transactions, 1842, Part I., p. 98, and fig. 48, he represents, what he conceives to be the mode of formation of muscular fibre from discs, which, "like their progenitors the corpuscles of the blood, become rings, which rings pass into coils, and the coils unite, thus forming spirals." If, however, it is the case, as we are strongly inclined to believe, that these so-called rings are themselves non-existent, but the creatures of misinterpreted

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centre, thus producing there triangular, oval, or irregular depressions. The cup-shaped variety is rather frequent in corpuscles which have been mixed a little while with saline solutions; and it is not uncommon in man, particularly among the particles of purulent or other morbid fluids."

* It is hardly necessary to remark, that all blood discs, even in the natural state, can easily be made to appear, erroneously, as rings, or with a dark nucleus, by varying the adjustment of the eclairage and the quantity of light.

appearance—the first links of this intricate chain will be wanting, and the ingenious superstructure, without cohesion.

Dr. Barry is of opinion, that muscle is nothing more than a "vast bundle of spirals;" and that the muscular fibres and ultimate fibrillæ, are all composed in a similar way, of various sized, interlaced, double spirals; and it is here that we would recall his remark, as given above, relative to the *oblique* direction of the line separating the apparent segments in the small filaments, in connection with the oblique direction of the spaces between the curves of the spiral threads in his larger figure. For if it can be shown, as it readily can be, that the transverse lines, though comparatively some distance apart in the ultimate muscular fibrillæ, of the salmon for instance, are strictly transverse, and circumscribe truly rectangular spaces, as represented rudely in this figure, and that the most careful adjustment of focus, will not show any diagonal lines connecting these transverse ones, how can such an appearance be explained upon the double spiral principle?

The same argument, perhaps, will not hold with regard to the transverse striæ of a whole muscular fibre, as it would be difficult to ascertain accurately whether they were or were not more or less oblique, as in fact they often are, not, in our opinion, from their being portions of a spiral, but owing to other causes, such as more or less irregularity in the degree of contraction of the ultimate fibrillæ, on different sides of the fasciculus, by the allocation of the constituent particles, of which fibrillæ the transverse striæ are formed; or by the mechanical traction of them, in the preparation of the tissue for microscopical examination; or in the pressure to which it may be subjected between the glasses.

Any one of these causes (or perhaps others might be assigned), are sufficient to produce more or less obliquity in the direction of the transverse triæ on the muscular fasciculus; and the two latter would suffice to produce the same obliquity in the transverse lines of an ultimate fibrilla, where such obliquity, as it often happens, is observable. We have not alluded at present to the existence of a spiral filament (not Dr. Barry's), in or upon the særcolemma of the muscular fasciculi, of which an excellent observer of our acquaintance, is, we believe, satisfied, as the consideration of it is remote from our present object. Some obscurities, perhaps, still hang over the structure of muscle; but, in Mr. Bowman's views on this subject we most fully concur, believing that they represent, as nearly as our present means of microscopic observation will allow, the truth in this *vexata questio*.

## XXXVII.—MICROSCOPICAL OBSERVATIONS ON THE PATHOLOGICAL MORPHOLOGY OF SOME OF THE ANIMAL FLUIDS, BY DAVID GRUBY, M.D.—No. 3.

*Translated from the Latin by S. J. Goodfellow, M.D., &c.*

[Continued from page 237.]

### OF LOBULAR INFLAMMATION OF THE PLACENTA.

The yellowish-white, hard, friable and fragile substances which occur in the human placenta, occupy a place towards the margin, or on the fœtal surface around the larger vessels. They have a thickness of half a line and more, but an extent of 2 — 4 lines.

Microscopical investigation teaches us, that these substances are composed of the larger molecules, also of globules, scarcely exceeding in size the blood-discs, having a smooth envelope, and made up very small molecules.—Plate 10, fig. 80.*

### GENERAL SUMMARY.

It is manifest from what has been said, that in every inflammation, whether acute or chronic, suppurative or adhesive, and whether occurring on the surface of membranous or in the substance of parenchymatous organs, either injured or uninjured, globules are formed—which, in inflammation of mucous membranes, being united to the fluid peculiar to those membranes, namely mucus, constitute purulent and puriform mucus, and crude or concocted catarrhal sputa; in inflammation of serous membranes, joined to their peculiar product, viz., serum, they constitute at one time turbid serum, and at another a puriform fluid, or purulent exudation; in cutaneous inflammations they constitute the contents of vesicles or pustules; in suppurative inflammation, united to a pellucid fluid they constitute pus; in adhesive inflammation, and in that of croup, joined to the plastic lymph, they form the false membrane of croup or a varnish-like exudation; in parenchymatous inflammation, united with plastic lymph, they constitute the inflammatory tumefaction; joined with a serous fluid, and filling up minute interstices, they appear as purulent infiltration; and when collected in larger recently formed cavities, they form the contents of abscesses.

Hence the products of inflammation—

1st. Differ according to the different medium with which the glo-

* The tables, shewing the characteristic properties of the different fluids treated of, will be inserted in our next number.—E. M. J.

bules, generated by inflammation, appear mixed; globules, for example, united to mucus, forms catarrhal purulent mucus, &c.; united to serum, purulent serum, &c.; united to a white fluid, pus; mixed with plastic lymph, plastic exudation, or purulent plastic exudation.

The medium with which the globules formed by inflammation appear mixed, then depends (A), upon the organization of the substratum of the pathological process. As long as the texture of the substratum shall not have been destroyed, even so long will there be a special character given to the product of inflammation, which depends upon the special character of the substratum, and not upon any peculiarity of the pathological process. But as soon as the texture of the substratum of the pathological process shall have been entirely destroyed, then the pathological product of the inflammation loses its special character; thus, for example, in inflamed mucous membrane, there is remarked a product of inflammation of a peculiar character, and purulent or puriform mucus is generated, as long as this membrane shall keep its peculiar and characteristic organization, which, being lost, the pathological product is equally deprived of its special character, and in place of puriform or purulent mucus, pus is generated. Hence it is manifest, that the essential difference between pus and mucus is to be sought, not in the globules, but rather in the fluid with which the globules appear mixed. There are not wanting chemical re-agents, by which a clear and distinct difference is evinced by which the product of inflammation of a mucous membrane, whose texture is not altogether destroyed, is distinguished from the product of that membrane whose continuity is injured or organization destroyed; for, in the destroyed part, the globules of inflammation no longer appear mixed with a medium distinguished by a special character.

The product of an inflammation, for example, from a suppurating wound of the mucous membrane of the lips of the mouth, is then in no ways distinguishable from the product of inflammation of a suppurating wound of the skin; but the product of an inflammation of the mucous membrane of the lips, its continuity being uninjured, is distinguished from it in the former case; for the globules of inflammation in the former case, joined to some limpid fluid, compose pus; but the globules in the latter case, mixed with the so-called proper mucus, do not form pus, but puriform or purulent mucus, to be distinguished by re-agents, as long as the organization of this inflamed patch shall not altogether have been destroyed.

Since the so-called globules of pus generated in every inflammation of mucous membranes are not to be distinguished from each other, whether the continuity be injured or not, which, although even formed from a mucous membrane whose continuity is injured, mixed with some

limpid fluid, compose the pathological fluid called pus, however then, at least, it can be distinguished by re-agents, while this pathological product, freed from all proper mucus, may be submitted to examination, which then, at least, can be done, provided that access to the pathological substratum is easily attained, as in the mucous membrane of the tongue, of the lips, palate, cheeks, nostrils, vagina, neck of the womb, nymphæ, anterior part of the urethra, inferior part of the rectum, conjunctivæ of the palpebræ and of the globe; but the product of inflammation formed from a breach of continuity of the mucous membrane in remoter parts, is almost always intimately mixed with the product of an inflamed and irritated adjacent mucous membrane, and in no manner is it discharged separate; thence the result of the examination of these mixed products is doubtful. Here we number the product of inflammation from breach of continuity of the mucous membrane of the pharynx, œsophagus, and whole alimentary canal, even to the inferior portion of the rectum, moreover that of all the air passages, ureters, urinary bladder, urethra, even to the scaphoid fossa, fallopian tubes, and cavity of the uterus, Eustachian tubes, and its propagations, sinuses, and different ducts, except a great part of the mucous membrane may have been destroyed; for then, from the great quantity of pus prevailing, there is not found sufficient mucus. Hence, pus nearly pure is thrown out, as is wont to occur in phthisical patients affected with large vomicæ of the lungs.

Not only the substratum, but also (B), the different intensity of the process of inflammation produces various media, with which globules of inflammation appear mixed; thus an irritated serous membrane generates a few globules united with a large quantity of aqueous fluid, and forms turbid serous fluid.

But a more intense inflammation of a serous membrane equally occasions a few globules, which united to plastic lymph, form intestinal adhesions. The same occurs in a mucous membrane; a slight irritation or inflammation produces globules united to mucus, but a more intense inflammation generates globules united to plastic lymph, and causes the exudation of croup, a degree of inflammation, which, when it occurs in the parenchyma of organs, produces indurations, hepatizations, and inflammatory tumours.

In suppurating wounds the same pathological product is distinguished by the name of granulations, and in simple recent wounds, by that of varnish or plastic lymph, by which the lips of wounds are quickly united, when they heal by what surgeons term "the first intention."

2nd. Pus of normal inflammation *differs according to the different duration of the pathological process;* for the globules, the inflammation commencing, in a relation to the medium with which they are mixed,

are few in number. They are white, composed of an envelope and the smaller molecules, at least usually, so that the pus is more fluid and white. The globules sensibly multiply, and are remarked of a white-yellow, or yellow colour, with an envelope, and smaller or larger molecules, and also a white central vesicle. The envelope swells in water, and is easily broken; but the molecules, with the central vesicles, being expelled, are firmly joined together. By a law of attraction, and at this time, the pus is rendered thicker and of a deeper yellow. In this way can be explained the reason why pellucid lymph taken from variolous vesicles, produces the effect of inoculation of the variolous contagion more surely than the turbid or purulent serum of the pustules; because the envelopes of the globules in the latter case being very quickly broken, the globules lose the power of generation and fecundation.

Pus of the most advanced stage of inflammation contains globules destitute of envelope, and lacerated; and if the secreting pathological organ shall have been open, they are intermixed with epithelium.

3rd. The product of a specific inflammation differs from the product of a normal inflammation; thus, in tuberculous inflammation of the lungs, peculiar lenticular bodies concentrically striated, occur which are six times larger than the globules of pus. In the variolous process, conoid or cylindrical animalcules, exercising a circular motion, are intermixed with the pus globules.

4th. Globules formed from irritation or inflammation of mucous and serous membranes, their continuity being uninjured, have usually a larger diameter than those of abscesses and wounds treated by dry remedies, on account of the prevailing abundance of serum, in which the globules swell as if in water.

5th. Pus, purulent serum, pathological mucus, pathological lymph, as well fluid as thick, are composed, like the blood, of globules and a fluid; the globules and the fluid differ as much also in quantity and quality. The quantity of the globules determines the colour and density of the pus. The form of the globules is different; most of them are round, some are elliptic, oblong, many cylindrical. Their magnitude is equally different; the smallest equal, the largest are eight times the diameter of that of the blood-globules. The colour of the globules is white or yellow, some are almost pellucid, others transparent. Globules of pus are provided with a very thin envelope; some, however, are destitute of it. Some are filled with very small molecules, but others with larger ones. The central vesicle is not met with in all, but some are endowed with two or three. In some the central vesicle is filled with the smallest molecules, in most of them the central vesicle is destitute of all molecules.

The fluid in which the globules are suspended, is either pellucid or diaphanous, at one time thicker, at another time less thick, or is quite as liquid as serum. In nitric acid and nitrate of silver solution, it is sometimes converted into yellowish-white shreds.

6th. As yet no material and specific difference has been observed between the product of ophthalmoblennorrhœa and phalloblennorrhœa, and the product of normal inflammation of other membranes.

### *In what manner does the Absorption of Pus take place?*

The globules of the mature pus are broken, but the smallest molecules, being scattered about, are easily seen to permeate the coat of the intermediate or capillary vessels, and to be mixed for a certain time with the blood, until they are deposited in a fit place (an excreting organ), for ulterior elimination, or into some organic non-excreting texture, and accumulated, are at length transformed into globules of pus, destitute of all covering, and at first form metastatic infiltration of pus, or purulent metastatic exudation (for example, Pyo-ophthalmum parturientium), more slowly metastatic abscess. Afterwards by a vital re-action, an inflammation arises around the metastatic infiltration; *new* globules of pus, endowed with an envelope, molecules, and a central vesicle shortly arise; so that even here and there, in a *metastatic* abscess, globules of pus, provided with an envelope, are to be detected.

In phlebitis or arteritis, *entire* globules of pus mixed immediately with the blood, and joined to it, are carried about in the sanguiferous vessels, until, from their larger diameter, the free passage through the intermediate vessels is interrupted; which taking place, the circulation of the blood-particles becomes impeded or retarded, and the stagnating blood separates into its constituent parts, as if it were out of the organism; the serum and the plastic lymph transude, the intermediate vessel is obliterated, and, we believe, in such manner is brought about that small inflammation, which, in lobulated organs, they call lobular hepatization or inflammation.*

But not in every organ does a globule of pus, interrupting the passage of the intermediate vessels, provoke or occasion stagnation of the blood, for as—

1st. The parietes of vessels shall be surrounded by a firm and elastic texture, then either the globule is driven onwards, or the dilatation of

* Although this may be one cause of lobular inflammation, there are unquestionably others.—*Translator.*

adjacent intermediate vessels is interdicted; hence metastatic inflammation in organs, endowed with fibres, occurs very rarely. Among these we number fibrous organs, as tendinous fibres, muscular fibre, nervous fibre, compact neurilemma, and osseous fibre, also organs endowed with an erectile tissue, as the glans and corpora cavernosa of the penis, and clitoris, the papillæ of the breast, and also the parietes of the arteries.

2nd. Moreover, hard glandular organs, as the prostate, virile, mamma, testicles, ovaries, womb, liver, kidnies, thyroid gland, the parenchyma of the spinal marrow and brain, the skin of the sole of the foot, of the palm of the hand and of the back. The less the resistance offered by the surrounding tissues to an intermediate vessel obstructed by a globule of pus, by so much the more difficult is the onward progress of that globule rendered; the greater the dilation the quicker and more frequent does metastatic deposition occur. Here we number soft, subcutaneous cellular tissue surrounding muscles, nerves, and salivary glands; the cellular tissue of the female breasts, orbit, &c.; vascular membranes, as that of the brain and spine, iris; synovial organs of the joints; soft parenchymatous organs, as the lungs, spleen, mucous membrane, and the skin, where it offers a soft, weak texture, as that of the eyelids, ears, pudenda of women, &c.

Pus received into the veins passes very rapidly by the pulmonary artery into the intermediate vessels of the lungs, where it chiefly produces metastatic lobular stagnations and inflammations.

But pus in the arteries is carried around to those organs chiefly to which the greater quantity of arterial blood is borne, or to which in the normal state the excretion of heterogenous substances, mixed with the blood, takes place, (brain and kidnies.)

3rd. The organs whose intermediate vessels are endowed with a large or too narrow diameter, seem unfit for metastatic depositions, as, for example,* the intermediate vessels of the corposa cavernosa, penis, are endowed with the largest diameters $= \frac{40\text{-}65}{10,000}$ of a Vienna inch; on the contrary, the smallest diameters of intermediate vessels are found in the tendons $= \frac{1}{107,000}$ of a Vienna inch.

In the same manner as the stagnation of the blood precedes exudation and hepatization in lobular inflammation, so in every inflammation of any substratum, of any extent, from whatever cause arising, the local stagnation, or at least the impeded and retarded propulsion of the

* According to the observations of the celebrated and excellent anatomist Berres.

the blood in any circumscribed place, we observe to precede exudation and hepatization. An inflammatory tumour from exudated plastic lymph takes place, redness from the dilated passage of the adjacent intermediate vessels, in which there is contained a greater abundance of blood which regurgitates from some obliterated intermediate vessels; pulsation in the inflamed texture then presents itself, whenever a new wave of blood is impelled towards the obliterated intermediate vessels, and hence arises also the dilatation of the adjacent intermediate vessels.* The impediments of the circulation in the intermediate vessels sensibly retard also the circulation in the capillary vessels resisting the expansion, until either they overcome the obstacle, or their tonicity being weakened, they also suffer dilatation; and in the same manner the smaller and larger vessels, and lastly the heart itself, on account of the impediment of the circulation, produces more vehement and quicker expulsions of blood, exciting an universal fever. Hence, or in this way is explained the diversity of the pulse, the pectoral pulse in pneumonia, because the left heart impels the blood into the aorta without any obstacle; the cephalic pulse, if the obstacle is in the circulation of the carotids, in a direct line impeding the expulsion of the blood; and the abdominal pulse, if the obstacle of the circuit of the blood has extended much into the mesenteric vessels, it flows back into the abdominal aorta, and thus is the impediment of expulsion placed in the left heart itself. It is thus that the free pulse, after venesection, is to be explained.

The liquor sanguinis quickly transudes the walls of the intermediate vessels, quickly rendered thin by dilatation; it separates into serum and plastic lymph; the plastic lymph, again, forms into molecules and soft fibrils, forming, by an organic molecular attraction, globules which we find enclosed between the fibres. Hence an inflammatory boundary—

1. From the texture of the pathological substratum.
2. ——— obliterated intermediate vessels.

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* It may be here stated, that the author's description of the smaller vessels is in accordance with the arrangement of Berres. Berres divides the vessels running between the larger arteries and veins (proceeding in the order of the circulation), into arterial capillaries, intermediate vessels (capillaries of English anatomists), of equal diameter throught their course, and venous capillaries. Most English, and French, and even German writers, on the contrary, call all vessels which gradually decrease in size, arteries or veins, according to whichever system they belong; while they confine the term capillaries to those intermediate vessels whose diameter is the same throughout their course.—*Translator.*

3. From the dilated intermediate and capillary vessels.
4. ———— recently formed soft fibrils.
5. ———— globules of pus, of inflammation.
6. ———— smaller molecules, here and there dispersed.
7. ———— small quantity of serum, with which we see the textures kept moist.

The exudation is changed in direct relation with the obliteration and dilatation of the intermediate and capillary vessels; and in the same manner as the obliteration proceeds from the centre of the inflammation to the periphery, so the whole process of inflammation is propagated from the centre (focus) towards the periphery. But if the cause exciting the inflammation, is more intense, it acts by destroying the normal texture; globules, mixed with serum, then form a peculiar fluid, named pus, in the limits of the injured organs, which flows together from its different parts, and either remains for a long time enclosed in a pathological cavity (abscess), or flows out from a pathological surface (wound); but the pathological fibrils, which, creeping over, constitute the granulations for the new intermediate vessels, are fixed to the parietes, until the pathological surface (wound) shall have ceased to exist. Hence the normal inflammatory process everywhere offers to us the same products, which differ as to the quantity and external form, but not as to quality and internal composition; for the inflammatory tumour and boundary of the *adhesive* inflammation is constructed of the same constituent parts as the true inflammatory boundary of *suppurative* inflammation. But in considering a pure, recent, incised wound, where all the parts are not only organically disturbed, but their texture and cohesion (the causes of all organic formations), in part of the incision are destroyed and removed, the suppurative inflammation will only be excited when the pathological surface shall not have been brought together by the aid of a suture or ligature; but if anything shall have brought the pathological surface of the lips of the wound in contact, then the adhesive inflammation will certainly be produced.

In the reported case, the mischievous power and the same lesion then may produce *suppurative* inflammation, if the pathological surface continue exposed, and the *adhesive* inflammation, if you shall have brought it together.

In a pure, suppurating, fistulous wound, pus is generated by the suppurative inflammation, as long as the pathological surface continues exposed or open; but, being brought together, (for example, by proper compression), the adhesive inflammation arises, and pus is no longer formed.

A contusion, like any other mischievous power sufficient to destroy the texture of the different soft organic parts; for instance, if it shall have destroyed the sub-cutaneous cellular tissue, will produce abscess; because the cellular tissue is destroyed, that is, its continuity has suffered to its smallest particles, so that it shall have been changed into a pultaceous mass; it then continues shut up by the pathological surface, which being brought together, for example, by proper compression, no pus and no abscess is formed, but the adhesive inflammation arises. But the recently destroyed cellular tissue, like every other organic substance, is delivered up to the circulation by absorption. When, however, on account of the situation of the pathological surface, or its rigid and firm texture, the bringing together of it is impossible, for example, in inflammation of the lungs, or the medulla of the bones, then suppuration only takes place.

*How is it explained, that the same situation of the same pathological process, produces at first Suppurative Inflammation, afterwards Adhesive Inflammation, according as a pathological surface shall have been present or absent ?*

As we understand the material pathological changes of inflammation, it behoves us to make plain the special cause or end of inflammation. The continuity of the skin and healthy cellular tissue being destroyed by a scalpel, the hidden openings of the intermediate and capillary vessels, and of the smaller vessels, pour out blood, until the capacities or diameters of the divided vessels become obliterated, partly by of the continuous energetic tone, and partly on account of the coagulation of blood stagnating next the orifices, by which a compress (trombus) in some larger vessel, and a stagnation of the blood-particles in the openings of capillary and intermediate vessels arise. The dropping of blood being stopped, a yellowish reddish-white, then yellowish-white, and at length a white pellucid fluid flows in small quantity from the wound, which is composed of a few blood-globules, and the larger globules of pus suspended in the liquor sanguinis. The opening being obliterated, the wave of blood is driven, without interruption, against the compress (trombum), the parietes of the smallest vessels are not long able to resist this action; hence the diameters of the intermediate vessels immediately adjacent to the obliteration are dilated, their parietes rendered thinner, and by reason of the diminished tone, the blood is ultimately moved with difficulty; the circulation in the dilated vessels is retarded

on account of the greater quantity of blood with which the dilated vessels are filled, and on account of the more manifest retardation the greater quantity of the *liquor sanguinis* transudes. This divides into serum and plastic lymph; the latter divides again into soft fibrils and the smallest molecules, which unite by attraction, and form globules, which are enclosed among the fibrils. The texture thus appearing red, on account of the dilatation of the smallest vessels, indurated and tumid from the great exudation and the larger quantity of blood in it, more hot from the rapid decomposition of the liquor sanguinis, and the quick transition of the fluid liquor into solid substance, painful from the compression of the adjacent nerves, is said to be *inflamed*.

The liquor sanguinis is deposited around the attenuated parietes of the vessels; that part of the parietes of the intermediate vessels next the wound is more quickly and extensively dilated than the other part of the wall of the vessels, which is as yet joined to, or in contact with, the adjacent texture. On this account the transudation of the liquor sanguinis is more easy and more copious in that free part of the wall to which *no* texture is opposed than in the other.

The more copious liquor transuding on the free surface from the vessels, even so as to fill the interstices of the texture, divides into serum and plastic lymph; the plastic lymph again forms soft fibrils, which adhere firmly, like glue, to the parietes, and the smallest molecules, which, in obedience to a physical attraction, form globules united with the serum; these two constituent parts form yellowish-white, yellowish-green white, limpid or turbid, thick or thin fluid, called at one time purulent fluid, at another puriform serum, purulent serum or pus.

The accumulated soft fibrils intermixed here and there with globules of pus, constitute the coagulating lymph or cement (vernix) of surgeons, by which the lips of a clean, recent wound are agglutinated together. What has been said concerning an open, suppurating surface, may be said of a shut suppurating surface, or an abscess.

The more the parietes of the minute vessels are extended, the more porous they become; by the continual transuding liquor, the pores become sensibly dilated; and where the fibrils of exudation shall have increased into the form of granulation, the liquor provides little rivulets for itself, which, from the liquor continually transuding, are sensibly rendered so large as to allow a globule of blood to permeate them; but when they decussate among themselves, the globule is easily repelled again into the mass of the blood, and in such way new intermediate capillary vessels are formed between the recently formed fibrils.

But if the lips of a wound shall have been united by suture or ligature, so that the pressure of the lips touching each other, shall at least be such that it may be equal to that of the adjacent healthy texture, then the parietes of the vessels observed on the pathological surface, find as equable a resistance as the other parietes of the vessels; hence an equable dilatation will have an equable exudation; and the globules of pus enclosed between the fibrils of plastic lymph, will remain as long as in every inflammatory boundary, viz., until they shall have been removed by absorption. Hence no pus is collected, and the lips of the wound glued together, are afterwards joined by new rivulets, aud then by intermediate vessels.

Therefore a pathological surface is the primary condition, and is in the highest degree necessary for engendering the process of suppuration; on the other hand, the removal of the pathological surface, is the one principal prop for preventing or impeding the suppurating process.

Hence is manifest:—

1. The value of proper compression in the treatment of inflammation.
2. The utility of blood-letting.
3. The utility of the application of cold.
4. The necessity of obliterating the minute vessels, for the production and sustaining of inflammation.
5. The necessity of continued inflammation for the recovery of injuries.
6. The utility of all irritating and stimulating remedies, even of those destroying the organic texture, for the obliterating of the intermediate vessels for this purpose, that the dilatation of their walls, and the retarded circulation of the accumulated blood, exudation of plastic lymph, formation of vessels and of new solid substance shall follow. In a word, that inflammation, where the process of inflammation is either insufficient, or shall have been entirely extinguished, may be sustained, or re-excited.

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The Translator thinks it proper to state, that he is in nowise answerable for Dr. Grüby's opinions. He leaves them entirely in the hands of the reader, without giving any opinion of his own as to their correctness or otherwise; but he thinks that, to any gentleman who can spare the time and have the opportunities, the various subjects alluded to by Dr. Grüby, offer a very fruitful and important field for observation and study.

## Extracts and Abstracts from Foreign Journals.

[From the *Reports of the Berlin Academy*, 1842.]

*Müller and Retzius' Anatomico-pathological observations upon certain Parasitic Growths.*—When engaged in the dissection of various marine animals, in the month of August, M. M. Müller and Retzius examined a haddock with a slender tail, and which, according to the fishermen, was diseased, and consequently unfit for food.

The disease was seated in the air-bladder, which contained a large quantity of a yellowish, greasy, inodorous substance. Under the microscope this substance proved to be very peculiar, containing corpuscles about 0.00058—0.00068″ long, and which resembled in form a smooth *Navicula* or the *Frustulia coffeæformis* of Agardh. They were constituted of two scales, connected by a granular matter. The corpuscles were at first closed, but afterwards opened longitudinally, being held together by the granular matter, and finally became separated. They were formed in cells, each of which contained several individuals. By this circumstance, and by the want of silica in the shell, these bodies are clearly distinguished from *Naviculæ* and similar Infusoria. They would appear to be more properly arranged together with the Psorospermia of fishes, in a distinct division of parasitic, merely vegetating, organic growths of specific structure,

The authors had also made further observations on the development of mould in the lungs and air passages of birds. These observations do not refer to the mould described by Mayer, Jäger, Heusinger, Theile, and more lately by M. Deslongchamps, as found in the lungs of birds soon after death, but to a fungoid growth, consisting of flattened masses of a firm and remarkably tough substance. This growth was noticed by M. Deslongchamps, as forming the substratum of the filamentous mouldiness discovered by him in the lungs and air passages of an Eider duck, which was sick and affected in its breathing; but its real nature, as it would appear, was overlooked by him, since he mistook this vegetation for an albuminous exudation. The fungoid masses have been observed, once in Stockholm and once in Berlin, under circumstances altogether alike. The former instance was that of a *Stryx nyctea*, which had been brought from Lapland, and had lived part of the winter in Stockholm, but was always unwell and short breathed. The dissection was made by Prof. Retzius, and the preparation has been for a long time in the Anatomical Museum at Stockholm. The lungs and thoracic cavities were found to be universally covered with mushroom-like, flat-rounded bodies of yellowish-white colour, slightly depressed in the centre (or cup-like), and having their surface marked with concentric rings; they were of various sizes, from very small to that of a diameter of 1 or 2 lines or more. They were very closely attached, but could be detached without injury to the mucous membrane. Several neighbouring patches ran together, and had their

outer rings in common. In two places the air-passages were covered to the thickness of 1 to 1½ lines, with these confluent bodies, which thus constituted a continuous layer of almost cartilaginous consistence. The second instance, in which a similar occurrence was observed, is that of a *Falco rufus*, which was brought to the Zoological Museum of Berlin, having been shot two years before. In this case, M. Dubois discovered the white, cup-shaped, flattened bodies, quite fresh, in the air-cavities, and also in the abdominal cavity in the neighbourhood of the kidnies, the surface of which presented many of them.

M. Müller was at first unable to recognize any structure in these bodies; but, upon further microscopic examination, some degree of structure or organization was evident in all of them, though not always very readily made out; in numerous instances, by fortunate sections, very transparent, delicate, branched filaments were observable in amorphous substance. These filaments were so evidently of vegetable nature, that no one who saw them had any doubt on the matter; they appeared such to MM. Link and Klotzsch. There were, however, other more irregular and much thicker filaments of more doubtful nature, which were scattered about, and distinguished by their protuberant margins; these filaments were also occasionally seen to be agglomerated into distinct, rounded masses.

The vegetable nature of these patches cannot be doubted. The filaments of the mould growing upon these patches, bear no resemblance to the filaments *within* the patch; they are thicker and evidently jointed, as was observed by M. Deslongchamps, and are all frequently furnished with capitate, sporiferous bulbs. This mould is evidently an *Aspergillus*.

Organs of fructification have not been met with in the mushroom-like bodies, which, consequently, in this respect approach the doubtful *Sclerotiæ;* but direct observation of the latter, as *Sclerotium semen, complanatum,* does not show any close resemblance; still less similarity is observable in the structure of *Dacryomyces stillatus*.

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[From *Müller's Archives.*]

*Simon on an Acarus inhabiting Diseased and Healthy Hair-follicles of Man.*—In reference to the nature of acne, the inquiry may be made, Whether the pustules constituting this eruption, arise from disease of any of the special organs present in the skin, such as the sebaceous and hair-follicles; or whether they arise from inflammation and suppuration in the fibrous tissue of the skin itself, without preceding morbid affection of any other part of it? I examined, with a view to determine this question, the contents of acne particles opened in living persons; and frequently found, as well in the small pustules, which soon burst, and which have been termed acne simplex; as in the larger ones (formed by more or less reddened indurations of the skin), of acne indurata, besides pus, small, elongated, whitish-looking bodies. When brought under the microscope, I always found in these a hair, which was sur-

rounded by the whitish body. The figure of this body, as well as the relation it bore to the hair, placed it beyond doubt that it was a hair-follicle; and it differed from a normal hair-follicle only in the circumstance, that it was much more delicate, and appeared as if it had been macerated, so that by moderate traction it was readily divided into several portions. Sometimes, also, I observed parts of sebaceous follicles in connection with the sac. In smaller acne pustules I found commonly only one hair-follicle, but in the larger, several. Similar whitish bodies were not observable in the matter expressed from the acne pustules; and I after remarked, when the whole of the contents were brought under the miscroscope, among them one or more hairs, which were sometimes entwined together, or rolled up in a spiral form.

Although these facts rendered it probable that acne originates in an affection of the hair-follicles, still, on the other hand, there was reason to suppose, that the inflammation which gave rise to the pustule, commenced in the true tissue of the cutis: and that by the occurrence of the suppuration, the connection of the hair-follicles with the skin was destroyed and thrown off when the pustule burst.

One of the morbid affections of the skin, differing from the pustules of acne, appeared to me calculated to throw some light on the subject. There are frequently observable, especially in those who are subjects of acne, black specks on the surface of the skin, which are caused by the accumulation of sebaceous matter in small follicles of the skin, and which are known under the name of maggots *(Comedones Acne punctata.)*

A real pustule of acne is not unfrequently seen to be formed in consequence of inflammation around one or more of these little bodies, and not unfrequently we may recognize also, on pustules of acne, the commencement of which may not have been observed, by the presence of one or more black points, that they also must have arisen in a similar manner. Should this demonstrate that the *Comedones* are in some way altered hair-follicles, the conclusion becomes manifestly more obvious, that the pustules of acne originate in disease of those follicles. According to the opinion of many authors, these maggot-like bodies consist in an abnormal accumulation of sebaceous matter in the fat-secreting glands of the skin, which have been hitherto considered as simple sacs.

These glands, however, open directly on the surface of the skin only on those parts which are entirely without hair, as the glans and nymphæ; in other parts of the body, their orifices are always in connection with hair-follicles: at least this is the result of all late observations, and in my researches on the skin of the face, I have not been able in any case to find a fat follicle independent of this connection. Where such distinct gland has appeared to exist, the total want of orifice, or at least of one reaching the surface of the skin, has shown that the hair-follicle belonging to it had been cut away.

As all this rendered it certain that the little follicles in which the accumulations of sebaceous matter forming the *Comedones* are found, could not be the fat glands; so the following observations proved them to be in reality hair-follicles.

Earlier investigations had informed us, that the little expressed masses consisted of minute vesicles, many of which are filled with sebaceous

matter. I also frequently found the contents of these bodies to be so composed, but besides remarked in numerous instances, one or more hairs in them, which were either scattered about irregularly in the expressed matter, and curved in various directions, or lay together in a parallel direction. This was especially and very frequently observable in large black pointed *Comedones* on the nose. The number of hairs thus formed, in some cases, was extraordinarily great, occasionally amounting to above forty. The hairs contained in the large nasal *Comedones* had moreover this peculiarity, that they did not terminate in a sharp point, but appeared to be cut off, so as to have a rounded extremity. The examination, also, of the integument in the dead subject, clearly proved the *Comedones* to be morbidly altered hair-follicles. I took some perpendicular sections of the integument of the nose, furnished with many of these bodies, and examined them under the microscope, when they clearly appeared to be sacculi, closed below and opening at the surface of the integument. They all had the form of the hair-follicle, with the exception that they were a little wider than the normal ones, as I proved by comparison with unaltered hair-follicles taken from another body. In the interior of the dilated follicles there was a large accumulation of sebaceous matter, and either one or a great number of hairs. When many hairs were present, no part of the sheath, which naturally surrounds the lower part of the hair within the outer sac, was distinguishable; but the collected hairs appeared to lie loose in the outer sac.

The sebaceous matter could be expressed through the opening of the hair-follicle. Thence it would appear, that the maggot-like bodies are in fact hair-follicles, and that they are occasionally converted into the pustules of acne; and it is very probable, that when the pustules do not thus originate, some disease of the hair-follicles is still their real cause.

Further researches, however, are necessary to render this opinion certain.

But besides the above-mentioned parts, I found in matter from the *Comedones* of living subjects, other bodies, which I did not at first know how to explain. I frequently remarked in them a slender corpuscle about $\frac{1}{10}$th of a line in length, which was rounded at one end, and at the other, which was rather thicker, appeared to be furnished with short teeth. I at first conceived that the glands of the hair-follicles of the nose were differently constituted to those in other parts of the body, and that by the pressure I had torn away one of these glands with a portion of the follicle attached to it.

Opposed to this view, however, was the circumstance, on the one hand, that the more slender, rounded extremity of this body appeared completely closed; and, on the other, that the thicker, toothed end was always in the same form, which could not well have been the case with detached or torn away portions of a gland. I consequently pursued my examination of these bodies, and was at last convinced that they were animals; and, by using higher magnifying powers, I was able to make out clearly a head, legs, thorax, and abdomen.

This supposition was confirmed, when, on an occasion, in which I

had only moderately compressed the object, under the glass, I perceived motion in it. Since then I have repeated the observation so often, that I am perfectly convinced of its correctness.

I have also shown to many of our naturalists and physicians living specimens, which have been recognized as animals by all who have seen them. As the occurrence of hitherto unknown animalculæ in the human skin, appeared to me a very remarkable circumstance, the objection occurred to me, that these creatures might in some way become mixed with the matter extracted from the *Comedones*, either from the water employed or otherwise. It it true, the animals were invariably, closely enveloped by the fat cells, and became obvious when these were moderately drawn apart. But this did not appear to me altogether sufficient. I freed two perfectly clean slips of glass from all organic particles, by heating them strongly over a spirit-lamp, and extracted, with a needle cleaned in the same way, the contents of a *Comedo* from a living person, and placed them, without admixture of water or anything else, between the glasses, and still found the animalculæ. That these had been situated, not on the outer surface of the skin, but within it, was readily proved, by examination with a lens, which would have shown them, had they been on the surface. Also, when I scraped the surface of the skin with a knife, in persons whose *Comedones* contained animalculæ, and examined the matter thus removed under the microscope, I never found any in it; but these were always first apparent when the contents of the follicles were expressed. Altogether, up to the present time, I have found the animalculæ in three living men, whose ages were respectively 40, 30, and 22 years. All of them were healthy and very clean persons. The *Comedones* were in all three situated on the nose. In seven other living persons, in whom I had examined the contents of the follicles, I was unable to find any of the animalculæ.

Having in the above manner rendered it certain, that a peculiar species of parasite occurs in the integuments of living persons, I proceeded to search for it in that of the dead body. I chose for this purpose six bodies, four of which had very numerous *Comedones* in the nose, the other two but few. I took thin laminæ from the integument of that part, made by perpendicular sections, and in such a way that in each of them, some of the *Comedones* were present. On placing these lamellæ under the microscope, I remarked that the *Comedones*, which were evidently dilated hair-follicles filled with adipose matter, almost all contained animalculæ, many of which were still alive. By compression, I could also, most commonly, express these creatures through the opening of the hair-follicle, together with the sebaceous matter.

The examination of these portions of integument rendered it also clear to me, that many of the apparently normal hair-follicles contained animalculæ. In order to procure a satisfactory view of the width and other particulars of perfectly normal hair-follicle, I took thin slices from the integument of the nose of two bodies, in which there was no appearance of *Comedones*, and submitted them to the microscope, and found also in this instance one or more of the animals in many hair-follicles. I have altogether, up to the present time, examined ten bodies; two of new born infants, one of a child three years old, and seven of adults of both

sexes. In eight of these, six of which had *Comedones*, I found the animalculæ sometimes in unnaturally dilated, and at others in perfectly natural, hair-follicles of the nose and immediately surrounding parts.

I have not hitherto examined the hair-follicles of other parts of the body. The only bodies in which no animalculæ were to be found, were those of the two new-born infants. Dr. Troschel has found them also in the integument of the upper lip of a woman.

They exhibit differences, arising from age. The form which I have most commonly observed is 0.085 — 0.125 of a line long, and perhaps 0.020 of a line broad. The head, which becomes narrower in front, consists of two bodies (the palpi), placed on the sides, and of a proboscis or snout lying between them. The palpi are composed of two joints, of which the posterior is the longer. The anterior and shorter one appears to have small dentations at its free extremity. The snout, which occasionally projects beyond the palpi, and sometimes stands back further than them, resembles a long tube. On the snout there is placed an organ of apparently triangular form, the very short base of which is situated at the posterior part of the snout; but its point hardly reaches quite to the anterior extremity of that part. By using a stronger power, it is seen that these triangular organs, are made up of two spiculæ or bristles lying together. The head is joined immediately to the thorax, which forms about a fourth of the length of the body, and is somewhat wider than the upper part of the abdomen. On each side of the thorax are placed four very short feet, of conical form, the base of which arises from the lateral part of the thorax. Ordinarily these dark, transverse lines are seen on each leg, which appear to indicate the presence of three distinct articulations. A high power, shows at the extremity of each foot, three slender claws, one long and two shorter. These claws are usually pointed, but sometimes appear to be rounded.

Figures corresponding to the above description are added to Dr. Simon's paper, from which the animalcule he describes would appear to be a minute Acaroid. We have examined the contents of the diseased follicles in many subjects, both dead and living, but hitherto without success in finding the animalcule described by Dr. Simon.—E. M. J.

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*Dr. Vogel on the Existence of Vegetable Parasites in Aphthæ.*—Dr. Vogel, like Schoenlein, Grüby, Gibert, and others, has seen vegetable parasites in different diseases of the human body; lately he has found them on the buccal œsophageal mucous membrane of an infant who died of aphthæ, fifteen days after birth. The mouth and œsophagus, as far as the cardia, were covered with an aphthous eruption. On examining this under a microscope of 220 powers, true confervæ, similar to those seen and described by Schoenlein as occurring in Impetigo, were distinctly visible. In these parasites, two elementary bodies were recognised: 1st, Small round bodies, with and without a central nucleus. Sometimes these were isolated, and sometimes they were grouped like mould on yeast; they had a diameter of from 1-300th to 1-500th of a

line, were colourless, and not acted upon by water, ammonia, or acetic acid. 2d, Filaments differently arranged, of a slaty colour *(ardoisés)* swollen at different points, either in the middle, or at their extremities. Occasionally they were articulated. Several of them were seen distinctly to take their origin from the round bodies: some of them were more than a line in length, and in general their diameter was about 1-600th of a line. They were likewise unaffected by water, ammonia, or acetic acid.—*Allgemeine Zeitung fur Chirurge, &c.;* and *Gazette Med. de Paris, April,* 1842; quoted in *Lond. and Edin. Month. Journ. Med. Science, July,* 1842, *p.* 595.

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*Dr. Sharpey on the Membrana Decidua and Uterine Glands.*—The uterine glands alluded to in the text have now been ascertained to exist in several orders of mammiferous animals, and from their enlarged size and augmented secretion during pregnancy, as well as the peculiar connexion which is then established between them and the fœtal membranes, it has been inferred that they are in some important way subservient to the nutrition of the fœtus. The uterine cotyledons of Ruminants were very generally considered to be of a glandular nature by the older anatomists, and as destined to supply a nutrient matter to the fœtus; indeed, it had not escaped notice, that these bodies actually yield a mucilaginous secretion. But besides the cotyledons, Malpighi discovered glands opening on all parts of the inner surface of the uterus of those animals, and recognised them as secreting organs. He has described them specially in the gravid uterus of the sheep. (Opp. 1687, vol. ii. p. 220.) At a recent period, the uterine glands of Ruminants were again observed by Baer, who also discovered similar glands in the sow; and although he erroneously supposed they were absorbent vessels, he described them well, and showed that they were connected in a peculiar manner with the ovum; the dilated orifices of the glands being attached to a small vascular spots on the surface of the chorion, which, in the sow, he describes as formed by little circular or star-like elevations of the membrane surrounding a central depression. (Ueber die Gefaessverbindung zwischen Mutter and Frucht, 1821.) This arrangement was justly considered by Dr. E. H. Weber, who afterwards investigated the subject, as a provision for the accumulation of the secreted matter of the glands, and for securing its effectual exposure to the blood-vessels of the fœtus. Weber also more fully described the glands in Ruminants, and observed glands of the same nature, though of a different form, in the uterus of the rabbit (loc. cit.) Still more lately, uterine glands have been discovered in the pregnant porpoise, by Dr. Eschricht of Copenhagen; and in the gravid uterus of the cat, the same observer found oblong cells lying under the mucous membrane, which he considers to be glandular cavities, though he could not discover their orifices on the inner surface of the membrane. (De organis quæ resp. et nutr. fœtus mammal. inserviunt. Hafn. 1837, p. 43.) Having had occasion to observe these glands in the uterus of the bitch, and having examined their condition in various stages of pregnancy, as well

as their relation to the membranes of the fœtus, I beg to subjoin an outline of my observations.

The glands of the mucous membrane of the bitch's uterus are of two kinds, simple and compound. The simple glands, which are the more numerous, are merely very short unbranched tubes closed at one end. The compound glands have a long duct, dividing into convoluted branches; both open on the inner surface of the membrane by small round orifices, lined with epithelium and set closely together. After impregnation, the parts of the mucous membrane which come into immediate relation with the ova, together with the glands seated in those parts, undergo a remarkable alteration. In a uterus between three and four weeks after conception, at which period the dilatations or chambers which contain the ova attained the size of a walnut, we find, on laying open one of the chambers, that the lemon-shaped ovum is surrounded by a broad belt or zone of villi, which rise from the surface of the chorion, and, becoming vascular, take part in the formation of the zonular placenta. Corresponding with this, there is a zonular portion of the inner surface of the uterus, somewhat raised above the rest, and perforated with small pits, into which the fœtal villi are received; and as this part of the membrane enters into the formation of the placenta, and comes away with the ovum at parturition, it is justly regarded as the decidua. The decidua is no new structure, however; it is merely a portion of the mucous membrane become more thick and vascular than the rest, and the pits on its surface, which receive the fœtal villi, are merely the glands already mentioned somewhat enlarged and widened. While, however, the simple glands merely undergo a uniform enlargement, a change takes place in the compound glands of a much more remarkable character. The long excretory ducts of those glands, immediately before they open on the inner surface of the membrane, become dilated into cells, one for each gland, which are filled with a semi-fluid whitish granular secretion, and are lined with epithelium. These cells form a layer beneath the surface of the decidua, and being crowded together, assume a polyhedral form. At the bottom of each, the tubular duct may be seen about to expand into the cell, and the cell again contracts at its orifice.

In a somewhat more advanced stage, the glandular cells enlarge, their orifices expand, and now membranous processes rise from the surface of the ovum and enter the glandular cells, passing a little way beyond the orifices, by the circumference of which they are embraced. These fœtal processes are prolonged from the chorion and its vascular lining or endochorion, and hence contain ramifications of the umbilical vessels. They are for the most part hollow or saccular, at least at first, and some of them present, for a time, a small aperture of communication between their cavity and the general sac of the chorion, or rather of its vascular lining, but this is soon obliterated; ultimately, they come to resemble much the villi in structure, differing only in size and form. As pregnancy advances, the parts described enlarge, the villi become more complex by rammification, the fœtal processes also give off numerous lateral offsets; but their broad flattened tops, which close the mouths of the glandular cells, are smooth and even, and are covered with a prolonga-

tion of the same epithelium which lines the cells. The maternal or decidual vessels are everywhere closely applied to the surface of the villi, and fill up the intervals between them. They also closely embrace the fœtal processes, except at their expanded summits, which, as before stated, are in contact with the secretion of the glandular cells. The maternal vessels, in proceeding from the uterus, first ramify on the parietes of the cells, by which they are supported; but as they approach the villi and surface of the ovum, they form an abundant net-work, the branches of which are unsupported by membranous structure, seemingly as if the intermediate tissue of the decidua had disappeared, its vessels alone remaining in the later periods of pregnancy. At parturition, the decidual vessels come away with the ovum; the parietes of the now greatly enlarged glandular cells also separate in great part from the uterus, leaving merely the bottoms with the round openings of the glandular ducts in their centres. After separation of the ovum and placenta, numerous truncated and somewhat shrivelled vessels project from the inner surface of the uterus; they are chiefly veins, and they may be seen for a considerable time after parturition, on those parts of the uterus to which the ova had been attached.

From the description given, then, it follows, that in the placenta of the bitch there is an arrangement by which a matter, secreted from the enlarged glands of the uterus, is brought into proximity with the vessels of the fœtus; and seeing that a provision of a similar nature is found in various other instances, it is not improbable that in viviparous animals generally, a matter deposited from the maternal system by means of a glandular apparatus may be absorbed into that of the fœtus, and serve for its nutrition; but this is a question which can be determined only after a more extended investigation. As connected with this subject, the source of the well-known green-coloured deposit found at the borders of the placenta of Carnivora would naturally become an object of inquiry; but on this point I cannot as yet speak with certainty.

*Dr. Sharpey on the Human Decidua.*—These observations on the decidua of the dog led me to examine anew the human decidua, and more especially its relations to the mucous membrane of the uterus; and I shall now briefly state the result, although I find I have been in a great measure anticipated by Weber, as appears from the statement of Professor Müller in the text. It is right to mention, however, that the results were arrived at quite independently of Weber's observations, and, indeed, before the original of the pages of this work in which they are noticed, reached me.

In various instances in which there was reason to believe that impregnation had recently taken place, and in which the ovary contained a recent corpus luteum and the uterus a distinct decidual lining, though no ovum had been discovered, the decidua, in some places one-tenth of an inch thick, seemed obviously to consist of the thickened mucous membrane. Its surface presented a multitude of small round apertures, which, on a verticle section, were seen to belong to the tubular glands of the mucous membrane, elongated and enlarged. These tubes were lined with white epithelium, which rendered them very conspicuous

They were much waved and contorted towards their deep and doubtless closed extremity; and at various parts they appeared to be implanted at some depth in the tissue of the uterus. Whether any of them divided into branches I could not determine. In a specimen belonging to Dr. John Reid, the uterus contained an early ovum, considered as dating little more than fifteen days after conception. The decidua vera was somewhat corrugated on the surface. It had the usual cribriform aspect, and the pits were for the most part wider than in the earlier examples; but the smaller orifices still presented the character of the tubular glands, and others showed an obvious transition between these and the larger ones. On making a section parallel with the surface, it appeared that may of the pits had a comparatively wide cavity, with a narrow orifice. From these and other observations of a similar kind, I was led to conclude that the apertures on the decidua which gave to that membrane its well known cribriform character, however much they may be modified in the latter stages of pregnancy, are originally nothing else than the openings of the glands of the lining membrane of the uterus; and that, as in the bitch, the mucous membrane is really converted into the decidua, and discharged from the uterus at parturition,—an opinion, it may be remarked, adopted on other grounds by various continental physiologists. In a uterus supposed to have been recently impregnated, and in which the vessels had been minutely injected with vermilion, the lining membrane or commencing decidua appeared everywhere pervaded by a network of blood-vessels, in the midst of which the tubular glands were seen, their white epithelium strongly contrasting with the surrounding redness. In more advanced stages the veins of the decidua form large ramifying canals in the substance of the membrane, which freely communicate with the uterine veins. On inflating these venous canals of the decidua with a blowpipe, the air will frequently pass out at the openings on the surface of the membrane which we have considered as the orifices of the enlarged uterine glands, and it might hence be concluded that there is a natural communication between the two. I am nevertheless disposed to think, that the venous canals and glandular recesses form two separate systems of cavities within the decidua, divided from each other by very thin parietes, which are easily ruptured. I am inclined to adopt this opinion, in consequence of repeated examination, in various ways, of the structure in question, (though I must admit that the result has not been always favourable,) and also from considering that the pits in the decidua appear, as already stated, to be merely the enlarged uterine glands, which, when observed in earlier stages, seem to have the same relation to the surrounding blood-vessels of the decidua as is known to subsist between glands and blood-vessels in general.

An objection to the opinion, that the decidua is merely the altered mucous membrane of the uterus, which will naturally occur, is the difficulty of accounting on that view for the investment of the ovum by the decidua reflexa, which is continuous with the uterine decidua, and is believed by most, though not by all physiologists, to have a similar origin. At the same time, the force of this objection is lessened by the fact, that the decidua reflexa, though continuous with the vera, does

not, usually at least, present the same character as the vera throughout its whole career; for, without laying stress on the differences generally pointed out by authors, I may state, that in various conceptions which I have examined, the decidua reflexa, in a great part of its surface, was destitute of the small orifices which characterise the vera, and that these were confined chiefly, though certainly not entirely, to a zone of the membrane adjoining the angle of reflection, that is, to the part next the decidua vera. Now, if this observation be found to hold good generally, it will not be necessary to suppose that the lining membrane of the uterus is extended over the whole surface of the ovum to form the decidua reflexa; and although I am not prepared on such limited observations to offer a decided opinion, especially on a question of acknowledged difficulty as this is, still, as at least a possible explanation, it might be suggested that the minute ovum, on its entrance into the uterus, is covered with exuded lymph, either entirely or on that part of its surface which does not adhere to the inside of the uterus; that as the ovum enlarges, a circular fold of the altered mucous membrane (decidua) is drawn up upon it, all round its adhering part, enveloping the ovum to a greater or less extent, and afterwards forming the cribriform zonular portion of the decidua reflexa, whilst the remaining thin smooth portion of the latter membrane, which is more distant from the line of reflection, and is destitute of apertures, is formed by an extension of the covering lymph. Or perhaps the following more simple explanation might not be inadmissible: viz. that the minute ovum, on reaching the uterus, becomes imbedded in the substance of the then soft and pulpy mucous membrane, and that in its subsequent enlargement it carries along with it a covering of the membrane, which is expanded into the decidua reflexa.

Are the cells observed in the human decidua, by Dr. Montgomery, identical with the dilated uterine glands? Dr. M. occasionally found them to contain "a milky or chylous fluid," but he does not describe them as opening on the inner surface of the membrane.

In acknowledging the kindness of my friend Dr. John Reid, now Professor of Medicine in St. Andrew's, in freely placing at my disposal some very valuable specimens in his collection, I deem it due also to that gentleman to state, that he had previously observed the tubular structure of the mucous membrane of the uterus, and was led, by an examination of recently impregnated uteri, to infer that one of the earliest changes which occurs after impregnation, was an increased development of the tubular structure, and this he conceived was connected with the formation of the decidua. At the same time, he did not suppose that the mucous membrane was converted into the decidua, but was disposed to think that the decidua was secreted by the tubes of the mucous membrane."—*Note by Dr. Sharpey to Baly's Translation of Müller's Physiology, Lond. and Edin. Month. Journ. Med. and Science, Feb*, 1842.

## Bibliographical Notice.

*Monographia Anoplurorum Britanniæ; or, an Essay on the British Species of Parasitic Insects, belonging to the Order Anoplura of Leach, with the modern divisions of the Genera according to the views of Leach, Nitzsch, and Burmeister, with highly magnified figures of each Species. By Henry Denny, Curator of the Leeds Philosophical Society, &c., &c. London.* G. Bohn. 1842. pp. 262. 26 Plates.

The present volume is one of that class, which never fails to call forth the admiration of every lover of nature, whether scientific or not, as it cannot do otherwise than show the zeal, assiduity, and attention the author has given to this inconspicuous order of beings, by developing and bringing to light nearly one hundred new species, of whose existence there was not hitherto any decided proof.

The following will show the arrangement adopted in the work, and the number of species described under each genus, with brief characters of the Families and Genera :—

Sub. Class. I. *HEMIMETABOLA, Burmeister.*

Order II. *ANOPLURA, Leach.*

*Synonym.*—Aptera, *Linne.*—Antliata, *Fabr.*—Arachnida Parasita, *Latr.*—Rhophotera, *Clairville.*—Rhyncota, *Burmeister.*—Arachnides Acaridiennes, *Lamarck.*

Section I. Haustellata.

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Fam. I. *PEDICULIDÆ, Leach.*

*Synonym.*—Hemiptera epizoica, *Nitzsch.*—Fam. II. Siphunculata, *Latr.*

*Essent. Char.*—Antennæ of 5 joints, mouth with a fleshy Haustellum.

*Nat. Char.*—Apterus, parasitical; mouth consisting of a fleshy tuberculous inarticulate haustellum, armed at the extremity with retractile hooks; legs scansorial, tibiæ short, thick, armed at the apex on the inner side with a strong tooth, which, together with the large curved tarsus and unguis, forms a claw; tarsus one-jointed, unguis single; œsophagus, none; biliary vessels four, free, equal in length, enlarged towards their extremities. Males with two testicles on each side; females with five ovaries on each side of the uterus. Coitus exercetur mare femine submisso.—Food the blood of animals.

*Artificial Divisions of the Family.*

PEDICULIDÆ.

I. Legs of two kinds, anterior ambulatory; posterior scansorial; thorax large, not distinctly separated from the abdomen.....Genus I. PHTHIRIUS, (1 species.)

II. Legs all scansorial; thorax large, not distinctly separated from the abdomen; abdomen of seven segments.....Genus II. PEDICULUS, (3 species.)

III. Legs all scansorial; thorax generally narrower than the abdomen, and distinctly separated; abdomen of eight or nine segments.....Genus III. HÆMATOPINUS, (15 species.)

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## Fam. II. *PHILOPTERIDÆ, Burmeister.*

*Synonym.*—Orthoptera epizoica, *Nitzsch.*—Nirmidæ, *Leach.*

*Essent. Char.*—Antennæ filiform, with three or five joints; maxillary palpi none; mouth with strong mandibles.

*Nat. Char.*—Mouth beneath; maxillæ none; mandibulæ nearly concealed by the labium; pro-thorax narrower than the head; mesothorax none, or hid by the metathorax, which is very large; abdomen with nine segments; œsophagus long, unilateral, ending somewhat acutely in the cæcum; biliary vessels four, free, equal, without any particular enlargement. Males with two testicles on each side; females with five ovaries on each side of the uterus. Coitus exercetur mare femine submisso hujusque pedes tertios tenente antennis, si hæ sunt cheliformes. Metamorphosis indistinct, perhaps none?

*Artificial Divisions of the Family.*

| | Genus. | Sub-genus. |
|---|---|---|
| PHILOPTERIDÆ. I. Antennæ 5 jointed; tarsi, with 2 claws; *parasitic* upon birds..... | I. PHILOPTERUS. | I. Docophorus, (59 species.)<br>II. Nirmus, (59 species.)<br>III. Goniocotes, (2 species.)<br>IV. Gonioides, (9 species.)<br>V. Lipeurus, (18 species.)<br>VI. Ornithobius, (3 species.) |
| II. Antennæ 3 jointed; tarsi with 1 claw; *parasitic* upon quadrupeds. | II. TRICHODECTES, (10 species.) | |

### Fam. III. *LIOTHEIDÆ, Burmeister.*

*Synonym.*—Orthopterae pizoica, *Nitzsch.*—Nirmidæ, *Leach.*

*Essent. Char.*—Antennæ capitate, four jointed; maxillary palpi conspicuous; mouth with strong mandibles.

*Nat. Char.*—Mouth beneath, very near to the anterior margin; mandibles strong, armed at the end with two teeth; antennæ inserted in a cavity of the lateral margin; thorax of two or three segments; prothorax with the lateral margins protruding more or less, nearly the width of the head; mesothorax generally small, in some cases as wide as the head; metathorax large, the width of the abdomen; abdomen with nine or ten segments; œsophagus symmetrical, equal, slightly unilateral; biliary vessels four, free, thickened in the middle. Males with three testicles on each side; females with three ovaries. Coitus exercetur femina mari submissa. Metamorphosis indistinct.

*Artificial Divisions of the Family.*

| | Genus. | Sub-genus. |
|---|---|---|
| *LIOTHELIDÆ.* I. Tarsi with 2 claws. | I. Liotheum. | I. Colpocephalum, (12 species.)<br>II. Menopon, (22 species.)<br>III. Nitzschia, (*nova*, 1 species.)<br>IV. Trinoton, (4 species.)<br>V. Eureum, (2 species.)<br>VI. Lamobothrium, (5 species.)<br>VII. Physostomum (5 species.) |
| II. Tarsi with 1 claw. | II. Gyropus, (2 species.) | |

The only new genus which the author has added in the work, occurs in the last family, viz., Nitzschia We extract the characters for the sake of reference:—

#### Sub-genus III. Nitzschia, *Denny.*

*Synonym.*—Nitzschia, *Denny's MSS.*—Menopon, *Nitzsch.*

*Sub-gen. Char.*—Head oblong, triangular, orbital margin sinuated; *maxillary palpi* large and prominent; *antennæ* capitate, nearly concealed; *prothorax* narrow; *mesothorax* large, very distinct; *abdomen* oblong; *tarsi* with large involute pulvilli,

*Spec.*—Nitzschia Burmeisteri.—*Denny* (Louse of the common Swift.) —Menopon pulicare, *Nitzsch, MSS.*

The new species figured and described amount to 93, and the number of the illustrations of the Order 205, with, in most instances, numerous representations of isolated portions of each species.

The work has been got up with great care. With regard to the figures we can speak as to the accuracy of their outline and delicacy of their execution.

*October 19th*, 1842.—*J. S. Bowerbank, Esq., in the Chair.*

A PAPER was read by William B. Carpenter, M.D., "On the structure of the Animal Basis of the common Egg-shell, and of the Membrane surrounding the Albumen." The author found, on examining the thin membrane surrounding the albumen of the hen's egg *(membrana putaminis)*, that it consisted of several laminæ, each lamina being composed of interlacing fibres, between which numerous interspaces are left. On comparing this with a portion of egg-shell decalcified by means of dilute acid, both presented the same structure; but the laminæ were more numerous in the latter. He supposes that the deposit of calcareous matter takes place in the interspaces left by the reticulation of the fibres, and concludes that this fibrous membrane is analogous to the chorion of mammalia. A preparation, showing the identity of the two structures, accompanied the paper. Another paper was also read by Arthur Hill Hassall, Esq., entitled, "An explanation of the Cause of the rapid Decay of many Fruits, more especially of those of the Apple tribe." After some preliminary observations, the author proceeded to state, that on placing a portion of decayed apple under the microscope, he observed vast numbers of ramified filaments, passing in all directions between and around the cells of the parenchyma of the fruit; these filaments were regarded as those of a minute fungus or fungi, which, by insinuating themselves between the cells of the pulp of the fruit, detached them from their connection with each other, destroyed their vitality, and ultimately produced a decomposition of their contents. The author then gives his reasons for supposing the fungi to be the cause, and not the effect of the decay; and concludes by describing the several stages of development of the fungi, and their mode of entrance within the fruit. Specimens of the fungi were exhibited to the Society, after the reading of the paper.

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## Microscopical Memoranda.

*Ehrenberg on the Power of Vision in the Human Eye, &c.*—He concludes that there are, putting aside all inorganic bodies, even in the kingdom of organic bodies, whose constituent parts or molecules are generally considered to be the coarsest, magnitudes capable of direct proof, which are in diameter $\frac{1}{16.0400}$ of a line; and others that can be proved indirectly, which may be less than a sixth millionth part of a Parisian line in diameter; that the ideas often expressed respecting atoms, as subjects of experience, are somewhat too confident; finally, that the power of the microscopes, which we at present possess, does not in its maximum amount to more than to make distinctly visible long opaque threads of $\frac{1}{1.200000}'''$ diameter, and square superficies or globules of $\frac{1}{144000}$ of a line in diameter; and that for these latter they must be increased forty times, in order to satisfy what is required for reaching directly those minutest *parts of organic bodies*, whose existence has been inferred from simple deductions; and that we are to not to entertain a thought of perceptible, or ever attainable simple matter, or material primitive constituent particles.—*From Poggendorff's Annalen*

*der Physick und Chemie, Vol. xxiv. p.* 1, *Translated in Taylor's Scientific Memoirs, Vol. I. p.* 528.

*Rees and Lane on the Structure of the Blood Corpuscles.*—The chief points are, that the blood corpuscle contains a fluid, and that the corpuscle of mammals, as well as the other lower vertebrata, contains a nucleus. The human blood being $\frac{1}{3250}$th of an inch in diameter, its nucleus is described as a thin circular layer of colourless substance measuring from $\frac{1}{4500}$th to $\frac{1}{5000}$th of an inch.

With regard to the fluid, if we remember rightly, M. Mandl (Anatomi-Microscopique) expressly states his conviction, that the appearance of the corpuscles when removed from the body is due to coagulation, as he considers the corpuscles are in fact not solid while circulating in the living body. As to the nucleus, it appears to us that Messrs. Rees and Lane have described under this appellation the blood corpuscle deprived of its colouring matter, and which has been long well known,—an old thing with a new name. Thus Sir E. Home (Phil. Trans. 1818, p. 198, plate 8.), has figured sixteen globules in their colouring matter, occupying the same space as twenty-five of the same globules with the colouring matter removed. Schultz has described the same central part of the blood corpuscle, which he procured by washing blood with water and then adding iodine: and Gulliver saw them in abundance in the sediment of washed blood. "The human blood corpuscles, enlarged at first by water and then deprived of colouring matter and reduced in size, generally present a diameter of $\frac{1}{4800}$th of an inch, whether detected in the pure water, or rendered more apparent by corrosive sublimate. They have a very characteristic appearance, being remarkably flat and pellucid. It is obvious from the size, shape, and general appearance of these particles, that they are not identical with those generally described as the nuclei of the blood corpuscles. The average diameter of the discs in the first instance was $\frac{1}{3429}$th of an inch." (Lond. and Edin. Phil. Mag. for Feb. 1840.) It does not appear to us to follow as a matter of course, that this basis of the mammiferous corpuscle is identical with the nucleus of the corpuscles of the oviperous vertebrata: on the contrary, we cannot help considering that there is an essential difference in this respect between the corpuscles of mammalia and the corpuscles of the lower vertebrata.—*Vide Guy's Hospital Reports, No.* 13, *Oct.* 1841.—*Lond. and Edin. Month. Journ. Med. Science, Dec.* 1841, *p.* 906.

*Goodsir on the Morbid Anatomy of Intestinal Glands, as occurring in Continued Fever.*—He stated it consist chiefly in the development within the vesicles of the Peyerian patches, of a matter presenting the appearance of nucleated cells with clear coats. This product, accumulating in quantity, destroys the walls of the vesicles, and extends itself between the mucous and submucous tissue, forming patches more or less elevated. The distension of the mucous membrane causes it to form a slough, which separates, and consists partly of the mucous membrane, but chiefly of the mass of cellular matter beneath.—*Lond. and Edin. Month. Jour. of Med. Science, April,* 1842, *p.* 399.

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